COUNTY EXPERIMENT FARMS IN OHIO

ANNUAL REPORTS FOR 1914

OHIO

Agricultural Experiment Station

WOOSTER, OHIO, U. S. A., MAY, 1915

BULLETIN 286

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BULLETIN
OF THE
Ohio Agricultural Experiment Station
NUMBER 286 MAY, 1915

COUNTY EXPERIMENT FARMS IN OHIO

By C. W. MONTGOMERY

The object of a County Experiment Farm, in connection with a County Agricultural Agent, is to discover, develop and introduce the most profitable system of farming for that county.

When Ohio was first settled the farmers as a rule were not governed by rules of economics as to the lines of farming which they took up. A historical survey would seem to indicate that they generally pursued the lines which were followed in the sections from which they came. In the early days, because of the virgin soil, the low cost of labor and the small demands of society, it was possible for the farmer to succeed though he violated some of the laws of economics. As the country grew older, however, it developed that some were prosperous and some were not, depending upon whether their system of farming was adapted to their soil, climate and markets. Today the demands of modern society are great, the cost of labor is high and the soil is no longer virgin. If it were desirable, we could not change these demands of society nor lower the wage scale, so that the question which confronts us now is how to meet these modern demands upon a depleted soil. That the problem is not the same in all localities is shown by the effect of fertilizer elements on corn and wheat grown in rotation on the several experiment farms of the state. (See Table XLIV.)

For a number of years the Experiment Station has been improving the yields of cereals by selection and breeding, with the result that in some varieties of wheat the yield has been increased several bushels per acre. Before these improved strains can be safely put in the hands of farmers, however, we must know to what soil they are adapted. In the past some disappointment has been experienced by farmers in cooperating with the Experiment Station in the trial of new varieties of cereals, because the varieties proved

not to be adapted to the farmer's soil and climate. But the Experiment Station could not know except by trial whether the new variety would be a failure or a success. By means of the County Experiment Farm, these tests can be made at a small cost on taxable property. After discovering that an improved strain is adapted to a certain locality the next step is to multiply it and distribute it to the farmers of that locality, and the county experiment farm will furnish the facilities for this work.

Scientific experiments, as well as practical experience all over the world, show that rotation of crops is fundamentally essential to economical crop production. Experiments also show that a leguminous crop should come in the rotation. Corn is the leading crop of Ohio, but the crops that should be grown in rotation with corn, what legumes and how often, are local matters and to some extent depend on the size of the farm and the livestock to be kept.

Paulding county in northwestern Ohio and Washington county in southeastern Ohio are examples of the difference in the methods of agriculture in different sections. In Paulding county we find a tendency toward large farms, and to the practice of grain farming, with a crop rotation of corn, oats and clover, the clover being sown in the oats and plowed under in the fall for corn the next year. In the Muskingum Valley in Washington county the tendency is to divide the farms and make truck patches out of them. What is the result of these systems on the value of the land? In Paulding county some farms sell for $250 per acre. In the Muskingum Valley, Washington county, some truck patches sell for $600 per acre. In both regions we note the absence of fences and livestock. Can the conclusion be drawn that livestock and fences do not belong on high priced land?

What are the problems in these two sections? In the Muskingum Valley it is how to get a supply of organic matter into the soil to maintain crop production. To accomplish this the truckers resort largely to plowing under cover crops and to the use of commercial fertilizers. In Paulding county the corn is husked on the stalk, which is returned to the land. Young clover is also plowed under, and thus far no definite increase has been obtained on the experiment farm from fertilizers and the increase from applications of manure has hardly paid for the cost of hauling and distribution. In this county we are starting an experiment in which the crops are harvested by hogs in order to determine whether grain farming or some form of livestock farming is the more profitable.

The difference in the schemes of profitable livestock farming for the various sections of the state is as varied as the crop rotation. A great part of Washington county is quite hilly and these hills, if devoted to cultivated crops, wash and erode so that for best results a large percent of the land must be kept in permanent pasture. A survey of one township in this county showed that 65 percent of the land was kept in permanent pasture and that but one animal unit was kept to 7.5 acres of pasture. At this rate it would require a good many acres of land to support a farmer and his family according to the demands of modern society. Clearly, in the hilly section of southeastern Ohio improving the pasture is a vital question.

Fully as important a question as the improvement of the pasture is how to utilize it so as to yield the most profit to the farmers. Sheep are suited to the hill country but wool is a commodity that lends itself to long transportation, and therefore while there is any cheap land in the world there the wool should be grown. A study of markets for a few years back reveals the fact that lamb mutton has ruled high, and we think it is likely to bring good prices for years to come. It is therefore thought best to make the production of lamb mutton a feature for the hills of Washington county. At the Experiment Station the Animal Husbandry Department has found that corn, soybean hay and alfalfa hay are good feeds for cheaply producing lamb mutton. Therefore a cropping system is planned with a view to growing these feeds. All the farmers of this hill section know the effects of dry hot summers on the hill pastures, so that plans are made for growing supplemental pasture crops also.

In Hamilton county there are many small farms and many people to feed and it is therefore thought that the production of pure milk would be the best line of farming for that section. The question with the farmer is not alone that of getting the pure milk but that of producing it at a profit under Hamilton county conditions. At the Experiment Station the Dairy Department has found corn silage, soybean hay and alfalfa hay very valuable feeds for cheaply producing this commodity. We have tried soybeans on the Hamilton county experiment farm and find that they give excellent yields. Statistics show that alfalfa is also successfully grown in many parts of the county. It is therefore planned to establish a two-year crop rotation of corn and soybeans, sowing a cover crop of rye and vetch at the last cultivation of the corn and plowing this under for soybeans the second year, making hay of the beans and sowing a cover crop of rye and vetch after the soys. These crops will be fed to dairy cows and the manure, reinforced with acid phosphate, will be returned to the land.

The following rotations are being started on the county experiment farms.

COUNTY EXPERIMENT FARM ROTATIONS

Miami County Experiment Farm

Rotation work.

1. Corn, oats, wheat, clover
2. Corn, soybeans, wheat, clover
3. Corn, corn, oats, clover
4. Tobacco, wheat, clover
5. Corn, wheat, clover
6. Potatoes, wheat, clover

Hog work. (Crops all harvested by hogs).

1. Corn continuously with rape sown as cover crop
2. Corn, corn, rye, clover

Field work.

In the field work the rotation will be corn, soys, wheat, clover. (These crops will be utilized by feeding to beef cattle in a manner determined by the Animal Husbandry Department.)

Paulding County Experiment Farm

Rotation work.

1. Corn, oats, wheat, clover
2. Corn, soys, wheat, clover
3. Sugar beets, oats, clover
4. Corn and oats with clover sown in the oats, to be plowed under in the fall for corn next year.
5. Corn and soybeans, rye and vetch being sown as cover crop at last cultivation of corn, to be plowed under next year for soys.

Hog work. (Crops all harvested by hogs.)

Corn continuously with rape for cover crop
Corn, corn, oats, clover

Field work.

In the field work the rotation will be the same as rotation 4, corn being husked on stalk, oats cut high so as to leave much stubble on land, clover sown in oats.

Hamilton County Experiment Farm

Rotation work.

1. Corn, soybeans, wheat, clover
2. Potatoes, wheat, clover

Dairy work. (Crops to be fed to the cows and manure, reinforced with acid phosphate, to be returned to the land.)

3. Corn, soybeans, rye and vetch to be sown at last cultivation of corn, to be plowed under for soys.
4. Corn two or three years, alfalfa two or three years.

Field work.

The field work to be corn, soybeans, wheat, clover. These crops to be fed to equipment livestock and dairy cattle and the manure to be reinforced with acid phosphate and returned to the land.

Clermont County Experiment Farm

Rotation work.

1. Corn, soybeans, wheat, clover
2. Corn, soybeans
3. Potatoes, wheat, clover

Field work.

Corn, soybeans, wheat, clover

Washington County Experiment Farm

Rotation work.

1. Corn, soybeans, wheat, clover

Field work.

Corn, soybeans, wheat, clover. (These crops to be utilized in the production of lamb mutton.)

THE MIAMI COUNTY EXPERIMENT FARM

FOURTH ANNUAL REPORT, FOR 1914

C. E. THORNE

The first, second and third reports on this farm were made in bulletins 241, 256 and 274. The present report covers the calendar year, 1914.

During this period of nearly four years the farm has been brought into condition for its work by the building of a barn, the rearrangement of fences, the planting of a small orchard, the draining of a part of the land and the starting of field experiments in crop rotation, the use of fertilizers and the comparison of varieties.

PERSONNEL

Early in the year Mr. M. C. Thomas was appointed County Agricultural Agent of the county experiment farm, and Mr. Perle A. Jones was appointed farm foreman.

CROP ROTATION AND SOIL FERTILITY EXPERIMENTS

Four rotations are in progress in this work, namely:

Rotation I: Corn, oats, wheat, clover.
Rotation II: Corn, soybeans, wheat, clover.
Rotation III: Corn, corn oats, clover.
Rotation IV: Tobacco, wheat, clover.

The arrangement of plots in the three cereal rotations is shown in Diagram I, and the plan of fertilizing in Tables I and II. The results thus far attained are shown in Tables III to VII inclusive. These tables show that acid phosphate, when used alone, has in every case increased the yield, the aggregate increase in the four crops of the rotation amounting to more than three times the cost of the fertilizer in each of the three cereal rotations, and to a still larger sum in the tobacco rotation.

When muriate of potash has been added to the acid phosphate there has been a further increase in yield, and in three of the four experiments the additional increase has more than repaid the extra cost of the fertilizer.

When nitrate of soda has been added to the combination of acid phosphate and muriate of potash the yield has generally been smaller than that from the phosphate and potash without the nitrate, and the high cost of the nitrate has materially reduced the net gain.

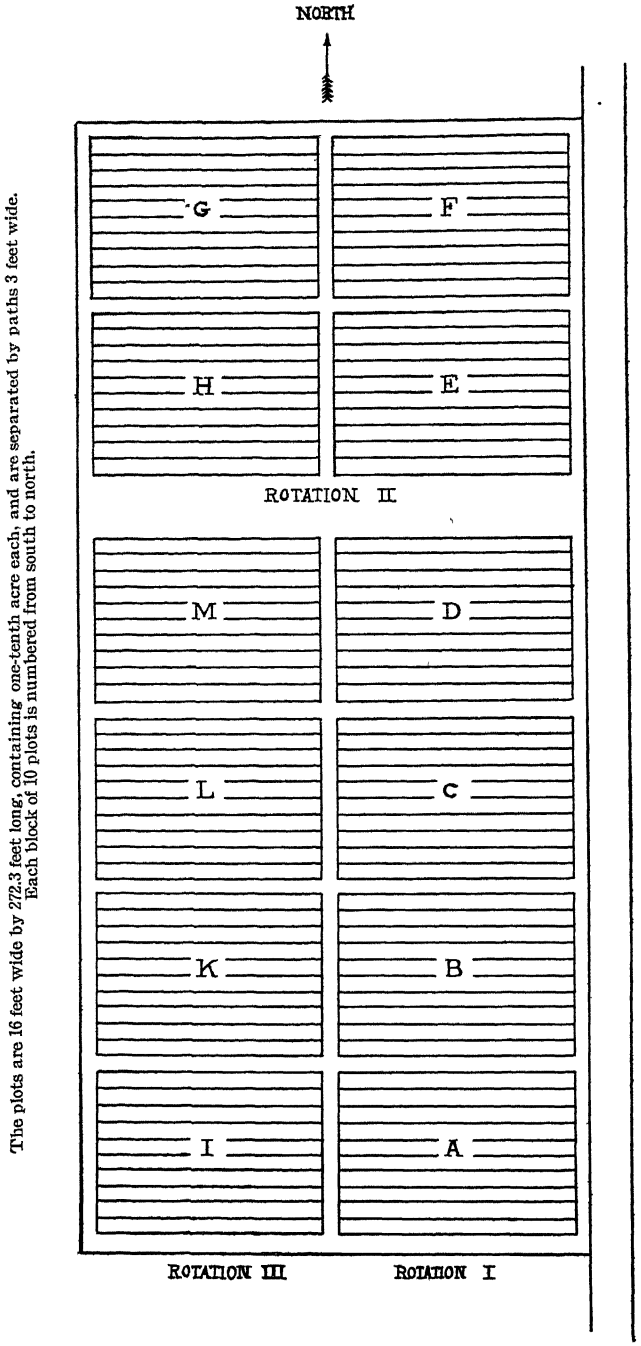


Diagram I: Arrangement of plots in cereal rotations, Miami County Experiment Farm

TABLE I: Plan of fertilizing in cereal rotations, Miami county experiment farm.

Pounds of fertilizing materials per acre for each crop

Plot No.	Acid phosphate	Muriate potash	Nitrate soda	Powdered limestone	Acid phosphate	Muriate potash	Nitrate soda	Acid phosphate	Muriate potash	Nitrate soda
	Rotation I: Corn, oats, wheat, clover									
	On Corn				On Oats			On Wheat		
1										
2	200				100			200		
3	200	50			100	20		200	20	
4										
5	200	50	50		100	20	30	200	20	80
6	200	50	50	4,000[1]	100	20	30	200	20	80
7										
8	Manure, 8 tons							200	50	50
9	Manure, 8 tons, phosphated[2]							200	50	50
10										
	Rotation II: Corn, soybeans, wheat, clover									
	On Corn				On soybeans			On Wheat		
1										
2	200				100			200		
3	200	50			100	20		200	20	
4										
5	200	50	50		100	20	30	200	20	80
6	130	50	20		70	20	10	160	20	20
7										
8	160	20	20		100			170		30
9	160	20	20	[3]	100			170		30
10										
	Rotation III: Corn, corn, oats, clover									
	On Corn 1st				On Corn 2nd			On Oats		
1										
2	200				200			100		
3	200	50			200	20		100	20	
4										
5	200	50	50		200	20	80	100	20	30
6	200	50	50	4,000[1]	200	20	80	100	20	30
7										
8	Manure, 8 tons				200	50	50			
9	Manure, 8 tons, phosphated[2]				200	50	50			
10										

[1]2,000 pounds in 1912. [2]40 pounds acid phosphate per ton of manure. [3]Catch crop to follow corn.

Cropping in 1913 and 1914

	Rotation I	Rotation II	Rotation III
1913	Block D—Corn	Block E—Corn	Block I—Corn 1st
	" C—Oats	" H—Soybeans	" M—Corn 2nd
	" B—Wheat	" G—Wheat	" L—Oats
1914	Block D—Oats	Block E—Soybeans	Block I—Corn 2nd
	" C—Wheat	" F—Corn	" M—Oats
	" B—Clover	" G—Clover	" L—Clover
	" A—Corn	" H—Wheat	" K—Corn 1st

TABLE II: Plan of fertilizing in cereal rotations, Miami and Paulding county experiment farms. Total fertilizing materials for one rotation; constituents and percentage composition.

	Total fertilizing materials for one rotation				Fertilizing constituents contained			Percentage composition		
Plot No.	Nitrate soda	Acid phosphate	Muriate potash	Total pounds	Ammonia	Phosphoric acid	Potash	Ammonia	Phosphoric acid	Potash
Rotation I: Corn, oats, wheat, clover										
2	...	500	..	500	..	70	45	.	14	.
3	...	500	90	590	..	70	45	.	12	7
5	160	500	90	750	30	70	45	4	9.5	6
6	160	500	90	750[1]	30	70	45	4	9.5	6
8	50	200	50	300[2]	130	76	105	.	...	.
9	50	200	50	300[3]	130	110	105	.	...	.
Rotation II: Corn, soybeans, wheat, clover										
2	...	500	..	500	..	70	..	.	14	.
3	...	500	90	590	..	70	45	.	12	7
5	160	500	90	750	30	70	45	4	9.5	6
6	50	360	90	500	9.5	50	45	2	10	9
8	50	430	20	500	9.5	60	10	2	12	3
9	50	430	20	500	9.5	60	10	2	12	2
Ration III: Corn, corn, oats, clover										
2	...	500	..	500	..	70	..	.	14	.
3	...	500	90	590	..	70	45	.	12	7
5	160	500	90	750	30	70	45	4	9.5	6
6	160	500	90	750[1]	30	70	45	4	9.5	6
8	50	200	50	300[2]	130	76	105	.	...	.
9	50	200	50	300[3]	130	110	105	.	...	.

[1]With 2 tons limestone dust
[2]With 8 tons untreated manure.
[3]With 8 tons phosphated manure.

TABLE III, Part 1: Fertilizers and manure on CORN. Miami County Experiment Farm.

Plot No.	Treatment per acre	1914				4-year average				Plot No.
		Yield per acre		Increase per acre		Yield per acre		Increase per acre		
		Grain Bus.	Stover Lbs.	Grain Bus.	Stover Lbs.	Grain Bus.	Stover Lbs.	Grain Bus.	Stover Lbs.	
	Rotation I (Corn-oats-wheat-clover) Block A									
1	None	53.36	2,250	....	...	44.55	2,310	.....	...	1
2	Acid phosphate, 200 lbs	60.29	2,150	5.26	—183	53.46	2,362	8.43	79	2
3	Acid phosphate, 200 lbs.; muriate potash, 50 lbs	61.64	2,550	4.95	133	55.93	2,692	10.41	436	3
4	None	58.36	2,500	....	...	46.00	2,230	.....	...	4
5	Acid phosphate, 200 lbs.; muriate potash, 50 lbs.; nitrate soda, 50 lbs	73.36	3,050	12.14	400	56.57	2,582	9.71	286	5
6	Acid phos., 200 lbs.; mur. potash 50 lbs.; nit. soda, 50 lbs.; powdered limestone, 2,000 lbs	70.00	2,950	5.93	150	58.09	2,730	10.36	368	6
7	None	66.93	2,950	....	...	48.59	2,427	.....	...	7
8	Untreated manure, 8 tons	71.50	3,450	2.43	267	60.37	2,685	10.83	242	8
9	Phosphated, manure, 8 tons	73.14	3,800	1.92	383	65.14	3,137	14.64	678	9
10	None	73.36	3,650	....	...	51.46	2,475	.....	...	10
	Average unfertilized yield	63.00	2,837	....	...	47.65	2,360	.....	...	
	Rotation II (Corn-soybeans-wheat-clover) Block F									
1	None	53.57	2,400	....	...	59.14	2,637	.....	...	1
2	Acid phosphate, 200 lbs	64.14	2,800	7.52	200	65.68	2,785	7.40	181	2
3	Acid phosphate, 200 lbs.; muriate potash, 50 lbs	68.57	2,850	8.91	50	67.82	3,000	10.42	429	3
4	None	62.71	3,000	....	...	56.53	2,537	.....	...	4
5	Acid phosphate, 200 lbs.; muriate potash, 50 lbs.; nitrate soda, 50 lbs	65.21	2,950	4.05	33	58.91	2,787	4.13	284	5
6	Acid phosphate, 130 lbs.; muriate potash, 50 lbs.; nitrate soda, 20 lbs	67.79	3,250	8.17	417	58.27	2,747	5.25	278	6
7	None	58.07	2,750	....	...	51.27	2,435	.....	...	7
8	Acid phosphate, 160 lbs.; muriate potash, 20 lbs.; nitrate soda, 20 lbs	69.50	3,400	9.24	500	60.09	2,785	9.57	367	8
9	Acid phosphate, 160 lbs.; muriate potash, 20 lbs.; nitrate soda, 20 lbs. Catch crop	69.93	3,100	7.48	50	55.87	2,770	6.10	370	9
10	None	64.64	3,200	....	...	49.02	2,382	.....	...	10
	Average unfertilized yield	59.75	2,837	....	...	53.99	2,498	.....	...	

TABLE III, Part 2: Fertilizers and manure on CORN. Miami County Experiment Farm.

Plot No.	Treatment per acre	1914				4-year average				Plot No.
		Yield per acre		Increase per acre		Yield per acre		Increase per acre		
		Grain Bus.	Stover Lbs.	Grain Bus.	Stover Lbs.	Grain Bus.	Stover Lbs.	Grain Bus.	Stover Lbs.	
	Rotation III (Corn-corn-oats-clover) Corn first crop: Block K									
1	None	67.93	3,300	....	...	40.39	2,150	.....	...	1
2	Acid phosphate, 200 lbs	67.50	3,400	3.40	233	50.41	2,412	8.87	237	2
3	Acid phosphate, 200 lbs.; muriate potash, 50 lbs	63.36	3,150	3.10	117	54.91	2,612	12.22	413	3
4	None	56.43	2,900	....	...	43.84	2,225	.....	...	4
5	Acid phosphate, 200 lbs.; muriate potash, 50 lbs.; nitrate soda, 50 lbs	56.36	2,750	4.29	67	53.39	2,550	10.62	332	5
6	Acid phos., 200 lbs.; mur. potash, 50 lbs.; nit. soda, 50 lbs.; powdered limestone, 2,000 lbs	53.00	2,400	5.28	—67	53.55	2,362	11.84	151	6
7	None	43.36	2,250	....	...	40.64	2,205	.....	...	8
8	Untreated manure, 8 tons	50.21	2,200	10.54	117	58.85	2,685	15.84	444	8
9	Phosphated manure, 8 tons	53.79	2,150	17.81	233	60.66	2,675	15.27	393	9
10	None	32.29	1,750	....	...	47.77	2,312	.....	...	10
	Average unfertilized yield	50.00	2,550	....	...	43.16	2,223	.....	...	
	Rotation III (Corn-corn-oats-clover) Corn second crop: Block I									
1	None	40.50	2,000	....	...	29.27	1,687	.....	...	1
2	Acid phosphate, 200 lbs	48.64	2,000	5.88	-17	44.99	2,207	11.93	422	2
3	Acid phosphate, 200 lbs.; muriate potash, 20 lbs	52.21	2,000	7.18	—33	48.80	2,347	11.94	46	3
4	None	47.29	2,050	....	...	40.66	1,980	.....	...	4
5	Acid phosphate, 200 lbs.; muriate potash, 20 lbs.; nitrate soda, 80 lbs	57.71	2,300	10.16	217	50.43	2,462	10.43	454	5
6	Acid phosphate, 200 lbs.; muriate potash, 20 lbs.; nitrate soda, 80 lbs	57.00	2,350	9.19	233	50.87	2,615	11.55	578	6
7	None	48.07	2,150	....	...	38.66	2,065	.....	...	7
8	Acid phosphate, 200 lbs.; muriate potash, 50 lbs.; nitrate soda, 50 lbs	68.21	2,950	14.73	517	35.12	2,885	15.50	688	8
9	Acid phosphate, 200 lbs.; muriate potash, 50 lbs.; nitrate soda, 50 lbs	69.64	3,250	10.76	533	55.43	2,992	14.84	664	9
10	None	64.29	3,000	....	...	41.55	2,460	.....	...	10
	Average unfertilized yield	50.04	2,300	....	...	37.53	2,048	.....	...	

TABLE IV: Fertilizers and manure on OATS. Miami County Experiment Farm.

Plot No.	Treatment per acre	1914				3-year average				Plot No.
		Yield per acre		Increase per acre		Yield per acre		Increase per acre		
		Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.	
	Rotation I (Corn-oats-wheat-clover) Block D									
1	None	22.81	1,220	.....	.....	41.61	2,503	....	...	1
2	Acid phosphate, 100 lbs.	38.91	1,355	9.75	22	48.93	2,617	4.60	233	2
3	Acid phosphate, 100 lbs.; muriate potash, 20 lbs.	41.56	1,670	6.04	223	54.27	2,588	7.21	322	3
4	None	41.87	1,560	.....	.....	47.79	2,148	....	...	4
5	Acid phosphate, 100 lbs.; muriate potash, 20 lbs.; nitrate soda, 30 lbs.	39.69	1,530	—.72	—177	53.68	2,142	5.21	46	5
6	Acid phosphate, 100 lbs.; muriate potash, 20 lbs.; nitrate soda, 30 lbs.[1]	45.78	1,835	6.82	—18	56.04	2,373	8.89	329	6
7	None	37.50	2,000	.....	.....	45.83	1,992	....	...	7
8	(Untreated manure on corn)	51.87	2,040	10.93	—150	47.18	2,090	7.60	190	8
9	(Phosphated manure on corn)	55.94	2,860	11.57	480	49.27	2,440	9.80	537	9
10	None	47.81	2,570	.....	.....	39.38	1,907	....	...	10
	Average unfertilized yield	37.50	1,840	.....	.....	44.15	2,137	....	...	
	Rotation III (Corn-corn-oats-clover) Block M									
1	None	32.50	1,210	.....	.....	40.62	1,983	....	...	1
2	Acid phosphate, 100 lbs.	46.51	1,465	12.45	52	49.80	2,198	5.84	—9	2
3	Acid phosphate, 100 lbs.; muriate potash, 20 lbs.	45.31	1,750	9.90	133	56.34	2,780	9.06	349	3
4	None	36.87	1,820	.....	.....	50.62	2,655	....	...	4
5	Acid phosphate, 100 lbs.; muriate potash, 20 lbs.; nitrate soda, 30 lbs.	45.31	1,750	6.04	—143	57.14	2,663	7.30	136	5
6	Acid phosphate, 100 lbs.; muriate potash, 20 lbs.; nitrate soda, 30 lbs.[1]	50.31	1,940	8.65	—27	58.12	2,712	9.06	312	6
7	None	44.06	2,040	.....	.....	48.28	2,272	....	...	7
8	(Untreated manure on corn)	54.37	3,360	8.43	1,180	41.87	2,940	8.05	748	8
9	(Phosphated manure on corn)	55.31	2,930	7.50	610	53.85	2,893	10.17	735	9
10	None	49.69	2,460	.....	.....	43.54	2,123	....	...	10
	Average unfertilized yield	40.78	1,832	.....	.....	45.76	2,258	....	...	

[1]Powdered limestone on corn.

The addition of ground limestone appears to have been profitable in each of the three rotations in which it was used.

If manure be valued at 50 cents per ton it has proved by far the most profitable fertilizer. In fact manure might be valued at a dollar per ton and still leave a larger margin than that found after most of the fertilizer combinations. But if the constituents of manure were rated at the cost of the same constituents in the chemical fertilizers, a rating which would bring its cost up to more than two dollars per ton, it would make no better showing than the chemicals.

Reenforcing the manure with acid phosphate, used at the rate of 40 pounds per ton of manure, has apparently increased its effectiveness. Judging from the relative effects of phosphorus and nitrogen, as used in the chemicals, it would seem probable that if the manure were used at a smaller rate per acre but in connection with a larger application of phosphorus a more economical effect might be produced.

TABLE V: Fertilizers on SOYBEANS. Miami County Experiment Farm. Rotation II, Block E.

Plot No.	Treatment per acre	Yield per acre		Increase per acre		Plot No.
		1914 Bus.	3-year av. Bus.	1914 Bus.	3-year av. Bus.	
1	None	21.17	23.17	....	....	1
2	Acid phosphate, 100 lbs	36.00	25.03	6.84	2.62	2
3	Acid phosphate, 100 lbs. + Muriate potash, 20 lbs.	29.00	23.31	1.77	1.64	3
4	None	25.33	20.94	....	....	4
5	Acid phosphate, 100 lbs. + Muriate potash, 20 lbs. + Nitrate soda, 30 lbs	24.33	21.69	1.78	1.22	5
6	Acid phosphate, 70 lbs. + Muriate potash, 20 lbs. + Nitrate soda, 10 lbs	21.50	19.28	1.72	—.72	6
7	None	17.00	19.53	....	....	7
8	Acid phosphate, 100 lbs	20.17	20.97	3.50	1.73	8
9	Acid phosphate, 100 lbs	18.42	19.81	2.09	.85	9
10	None	16.00	18.67	....	....	10
	Average unfertilized yield	22.37	20.58			

TABLE VI: Fertilizers and manure on WHEAT. Miami County Experiment Farm.

Plot No.	Treatment per acre	1914 Yield per acre Grain Bus.	1914 Yield per acre Straw Lbs.	1914 Increase per acre Grain Bus.	1914 Increase per acre Straw Lbs.	2-year average Yield per acre Grain Bus.	2-year average Yield per acre Straw Lbs.	2-year average Increase per acre Grain Bus.	2-year average Increase per acre Straw Lbs.	Plot No.
	Rotation I (Corn-oats-wheat-clover)									
1	None	14.25	1,095	.....	.....	21.71	2,360	.....	.....	1
2	Acid phosphate, 200 lbs	20.00	1,675	8.53	747	26.50	2,797	6.29	593	2
3	Acid phosphate, 200 lbs.; muriate potash, 20 lbs	17.25	1,315	8.55	553	26.46	2,762	7.75	714	3
4	None	5.92	595	.....	.....	17.21	1,892	.....	.....	5
5	Acid phosphate, 200 lbs.; muriate potash, 20 lbs.; nitrate soda, 80 lbs	7.00	1,630	1.89	1,112	18.50	2,590	4.16	990	5
6	Acid phosphate, 200 lbs.; muriate potash, 20 lbs.; nitrate soda, 80 lbs[1]	19.00	1,660	14.69	1,218	24.16	2,550	12.70	1,250	9
7	None	3.50	365	.....	.....	8.58	1,002	.....	.....	7
8	Acid phosphate, 200 lbs.; muriate potash, 50 lbs.; nitrate soda, 50 lbs.[2]	12.67	1,065	9.06	682	20.62	2,200	9.04	858	8
9	Acid phosphate, 200 lbs.; muriate potash, 50 lbs.; nitrate soda, 50 lbs.[3]	14.92	1,155	11.20	753	22.75	2,460	8.17	779	9
10	None	3.83	420	.....	.....	17.58	2 020	.....	.....	10
	Average unfertilized yield	6.87	619	.....	.....	16.27	1,819	.....	.....	
	Rotation II (Corn-soybeans-wheat-clover)									
1	None	14.67	1,270	.....	.....	23.58	2,335	.....	.....	1
2	Acid phosphate, 200 lbs	22.58	1,870	10.44	798	28.37	3,000	6.04	656	2
3	Acid phosphate, 200 lbs.; muriate potash, 20 lbs	21.42	1,815	11.81	942	30.00	3,425	8.92	1,073	3
4	None	7.08	675	.....	.....	19.83	2,360	.....	.....	4
5	Acid phosphate, 200 lbs.; muriate potash, 20 lbs.; nitrate soda, 80 lbs	20.83	1,850	13.92	1,182	32.16	3,825	12.97	1,502	5
6	Acid phosphate, 160 lbs.; muriate potash, 20 lbs.; nitrate soda, 20 lbs	18.50	1,560	11.75	898	30.50	3,555	11.94	1,268	6
7	None	6.58	655	.....	.....	17.91	2,250	.....	.....	7
8	Acid phosphate, 170 lbs.; nitrate soda, 30 lbs	19.08	1,435	12.22	763	28.58	3,275	11.34	1,175	8
9	Acid phosphate, 170 lbs.: nitrate soda, 30 lbs[4]	20.75	603	13.61	215	27.98	2,665	11.42	717	9
10	None	7.42	705	.....	.....	15.87	1,797	.....	.....	10
	Average	8.94	826	.....	.....	19.30	2,185	.....	.....	

[1]Fertilizers and limestone on corn. [2]Untreated manure on corn. [3]Phosphated manure on corn. [4]Catch crop to follow corn.

TABLE VI: Fertilizers and manure on WHEAT. Miami County Experiment Farm—Concluded.

Rotation IV (Tobacco-wheat-clover) Block O

Plot No.	Treatment per acre, all on tobacco	1914				2-year average				Plot No.
		Yield per acre		Increase per acre		Yield per acre		Increase per acre		
		Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.	
1	None	23.83	3,370	.....	.....	35.12	3,538	....	.....	1
2	Acid phosphate, 480 lbs	36.83	1,980	6.83	—1,220	38.08	2,587	90	—863	2
3	Acid phosphate, 480 lbs. Muriate potash, 180 lbs.	41.33	4,180	5.17	1,150	41.04	3,827	1.80	464	3
4	None	42.33	2,860	.....	.....	41.29	3,276	....	.....	4
5	Acid phosphate, 480 lbs Muriate potash, 180 lbs Nitrate soda, 240 lbs	41.67	4,200	3.89	1,247	42.67	3,932	3.91	735	5
6	Acid phosphate, 480 lbs. Muriate potash, 180 lbs. Nitrate soda, 240 lbs Ground limestone, 2,000 lbs	44.00	3,260	10.78	213	42.66	3,335	6.45	216	6
7	None	28.67	3,140	.....	.....	33.67	3,040	....	.....	7
8	Acid phosphate, 240 lbs Muriate potash, 90 lbs. Nitrate soda, 120 lbs	30.67	1,560	6.45	—993	35.17	2,297	3.17	—424	8
9	Acid phosphate, 400 lbs. Stable manure, 10 tons	33.33	3,100	13.55	1,133	35.33	3,065	4.99	661	9
10	None	15.33	1,380	.....	.....	28.66	2,08	....	.....	10
	Average unfertilized yield	27.54	2,688	.....	.....	34.68	2,985	....	.....	

TABLE VII: Residual effect on CLOVER of fertilizers and manure applied to previous crops. Miami County Experiment Farm, 1914.

Plot No.	Treatment per acre Total fertilizers and manure on previous crops of the rotation	Yield per acre Lbs.	Increase per acre Lbs.
	Rotation I (Corn-oats-wheat-clover)		
1	None	2,596	.....
2	Acid phosphate, 500 lbs	2,462	192
3	Acid phosphate, 500 lbs.; muriate potash, 90 lbs	1,751	*193
4	None	1,618	.....
5	Acid phosphate, 500 lbs.; muriate potash, 90 lbs.; nitrate soda, 160 lbs	1,707	311
6	Acid phos., 500 lbs.; mur. potash, 90 lbs.; nit. soda, 160 lbs.; ground limestone, 2 tons.	1,751	578
7	None	951	.....
8	Acid phosphate, 200 lbs.; untreated, manure, 8 tons	1,307	45
9	Acid phosphate, 200 lbs.; phosphated manure, 8 tons	2,196	623
10	None	1,884	.....
	Average unfertilized yield	1,762	.....
	Rotation II (Corn-soybeans-wheat-clover) Block G		
1	None	2,027	...
2	Acid phosphate, 500 lbs	3,173	986
3	Acid phosphate, 500 lbs.; muriate potash, 90 lbs	3,262	915
4	None	2,507	...
5	Acid phosphate, 500 lbs.; muriate potash, 90 lbs.; nitrate soda, 160 lbs	2,773	177
6	Acid phosphate, 360 lbs.; muriate potash, 90 lbs.; nitrate soda, 50 lbs	2,818	134
7	None	2,773	...
8	Acid phosphate, 430 lbs.; muriate potash, 20 lbs.; nitrate soda, 50 lbs	3,262	527
9	Acid phos. 430 lbs.; muriate potash, 20 lbs.; nitrate soda, 50 lbs. Catch crop**	3,173	495
10	None	2,640	...
	Average unfertilized yield	2 487	...
	Rotation III (Corn-corn-wheat-clover) Block L		
1	None	1,333	.....
2	Acid phosphate, 500 lbs	1,600	89
3	Acid phosphate, 500 lbs.; muriate potash, 90 lbs	1,644	*45
4	None	1,867	.....
5	Acid phosphate, 500 lbs.; muriate potash, 90 lbs.; nitrate soda, 160 lbs	1,911	192
6	Acid phos., 500 lbs.; muriate potash, 90 lbs.; nit. soda, 160 lbs.; limestone, 2 tons.	2,596	1,026
7	None	1,422	.....
8	Acid phos., 200 lbs.; mur. potash, 50 lbs.; nit. soda, 50 lbs.; manure, 8 tons	2,267	916
9	Acid phos., 200 lbs.; mur. pot, 50 lbs.; nit. soda, 50 lbs.; phosphated manure. 8 tons	2,578	1,298
10	None	1,209	.....
	Average unfertilized yield	1 458	.....
	Rotation IV (Tobacco-wheat-clover) Block L		
1	None	4,267	.....
2	Acid phosphate, 480 lbs	9,854	5,143
3	Acid phosphate, 480 lbs Muriate potash, 180 lbs	9,374	4,218
4	None	5,600	.....
5	Acid phosphate, 480 lbs Muriate of potash, 180 lbs Nitrate of soda, 240 lbs	7,964	2,245
6	Acid phosphate, 480 lbs Muriate potash, 180 lbs Nitrate soda, 240 lbs Ground limestone, 2,000 lbs	8,107	2,270
7	None	5,956	.....
8	Acid phosphate, 240 lbs Muriate potash, 90 lbs. Nitrate soda, 120 lbs	6,705	979
9	Acid phosphate, 400 lbs Stable manure, 10 tons	7,245	1,948
10	None	5,067	.....
	Average unfertilized yield	5,222	.....

*Decrease. **A catch crop of 1 bu. rye and 40 lbs. hairy vetch per acre, estimated cost including labor of seeding, $5.00 per acre.

TABLE VIII: Fertilizers and manure on cereal crops grown in rotation, Miami County Experiment Farm: Average value of increase, cost of fertilizers and net gain per acre for one rotation.

Pl't No.	Treatment per acre Total fertilizers and manure for one 4-year rotation	Average increase or decrease (—) per acre							Total value of increase	Total cost of fertilizer	Net Gain	Pl't No.
		Corn		Oats or soybeans		Wheat		Clover				
		Grain Bus.	Stover Lbs.	Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.	Lbs.				
	Rotation I (Corn-oats-wheat-clover)											
1	None	.....	...	....	....	.....	.....	...	.....	.....	.....	1
2	Acid phosphate, 500 lbs	8.43	79	4.60	233	6.29	593	192	$11.50	$ 3.75	$ 7.75	2
3	Acid phosphate, 500 lbs.; muriate potash, 90 lbs	10.41	436	7.21	322	7.75	714	—193	13.44	6.00	7.44	3
4	None	.....	...	....	...	.....	...	...	.....	.....	.....	4
5	Acid phosphate, 500 lbs.; muriate potash, 90 lbs.; nitrate soda, 160 lbs	9.71	286	5.21	46	4.16	994	311	11.49	10.80	0.69	5
6	Acid phos., 500 lbs.; mur. pot., 90 lbs.; nit. soda, 160 lbs.; ground limestone, 2 tons	10.36	368	8.89	329	12.70	1,250	578	21.41	16.80	4.61	6
7	None	.....	...	....	...	.....	...	...	.....	.....	.....	7
8	Acid phosphate, 200 lbs.; untreated manure, 8 tons	10.83	242	7.60	190	9.04	858	45	15.43	5.50	9.93	8
9	Acid phosphate, 200 lbs.; phosphated manure, 8 tons	14.64	678	9.80	537	8.17	779	623	20.16	7.90	12.26	9
10	None	.....	...	....	...	.....	...	...	.....	.....	.....	10
	Rotation II (Corn-soybeans-wheat-clover)											
1	None	.....	...	....	....	.....	.....	...	.....	.....	.....	1
2	Acid phosphate, 500 lbs	7.40	181	2.62	*593	6.04	656	986	$14.08	$ 3.75	$10.33	2
3	Acid phosphate, 500 lbs.: muriate potash, 90 lbs	10.42	429	1.64	597	8.92	1,073	915	17.90	6.00	11.90	3
4	None	.....	...	....	...	.....	...	...	.....	.....	.....	4
5	Acid phosphate, 500 lbs.; muriate potash, 90 lbs.; nitrate soda, 160 lbs	4.13	284	1.22	577	12.97	1,502	177	15.77	10.80	4.97	5
6	Acid phosphate, 360 lbs.; murlate potash, 90 lbs.; nitrate soda, 50 lbs	5.25	278	—.72	—187	11.94	1,268	134	13.45	6.45	7.00	6
7	None	.....	...	....	...	.....	.....	...	.....	.....	.....	7
8	Acid phosphate 430 lbs.; muriate potash, 20 lbs.; nitrate soda, 50 lbs	9.57	367	1.73	—43	11.34	1,175	527	17.01	5.20	11.81	8
9	Acid phos., 430 lbs.; muriate potash, 20 lbs.; nitrate soda, 50 lbs. Catch crop	6.10	370	2.56	508	11.42	717	495	16.10	10.20	4.90	9
10	None	.....	...	....	...	.....	.....	...	.....	.....	.....	10

*Soybean straw for 1914 crop only.

TABLE VIII: Fertilizers and manure on cereal crops grown in rotation, Miami County Experiment Farm: Average value of increase, cost of fertilizers and net gain per acre for one rotation. Concluded.

Pl't No.	Treatment per acre Total fertilizers and manure for one 4-year rotation	Average increase or decrease(−) per acre							Total value of increase	Cost of fertilizer	Net gain	Pl't No.
		Corn, 1st year		Corn, 2nd year		Oats		Clover				
		Grain Bus.	Stover Lbs.	Grain Bus.	Stover Lbs.	Grain Bus.	Straw Lbs.	Lbs.				
	Rotation III (Corn-corn-oats-clover)											
1	None	...	...	...	...	...	...	...	...	...	...	1
2	Acid phosphate, 500 lbs	8.87	237	11.93	422	5.84	—9	89	$11.41	$ 3.75	$ 7.66	2
3	Acid phosphate, 500 lbs.; muriate potash, 90 lbs.	12.22	413	11.94	465	9.06	349	—45	13.87	6.00	7.87	3
4	None	...	...	...	...	...	...	...	...	...	...	4
5	Acid phosphate, 500 lbs.; muriate potash, 90 lbs.; nitrate soda, 160 lbs.	10.62	332	10.43	454	7.30	136	192	12.69	10.80	1.89	5
6	Acid phos., 500 lbs.; mur. potash, 90 lbs.; nit. soda, 160 lbs.; limestone, 2 tons	11.84	151	11.55	578	9.06	312	1,026	17.58	16.80	.78	6
7	None	...	...	...	...	...	...	...	...	...	...	7
8	Acid phos., 200 lbs.; mur. potash, 50 lbs.; nit. soda, 50 lbs.; manure, 8 tons	15.84	444	15.50	688	8.05	748	916	21.06	8.25	12.81	8
9	Acid phos., 200 lbs.; mur. pot., 50 lbs.; nit. soda, 50 lbs.; phosphated manure, 8 tons	15.27	398	14.84	664	10.17	735	1,298	22.61	10.65	11.96	9
10	None	...	...	...	...	...	...	...	...	...	...	10

Pl't No.	Treatment per acre Total fertilizers and manure for one 3-year rotation	Rotation IV (Tobacco-wheat-clover)						Total value of increase	Cost of fertilizer	Net gain	Pl't No.
		To-bacco Lbs.	Wheat		Clover Lbs.						
			Grain Bus.	Straw Lbs.							
1	None	...	...	...	...	...	...	...	...	...	1
2	Acid phosphate, 480 lbs	252	90	—863	5,143	$40.59	$ 3.60	$36.99	2
3	Acid phosphate, 480 lbs.; muriate potash, 180 lbs.	340	1.80	464	4,218	45.98	8.10	37.88	3
4	None	...	...	...	...	...	...	...	...	...	4
5	Acid phosphate, 480 lbs.; muriate potash, 180 lbs.; nitrate soda, 240 lbs.	331	—3.91	735	2,245	33.07	15.30	17.77	5
6	Acid phosphate, 480 lbs.; muriate potash, 180 lbs.; nitrate soda, 240 lbs.; ground limestone, 2,000 lbs.	503	6.45	216	2,270	54.80	21.30	33.50	6
7	None	...	...	...	...	...	...	...	...	...	7
8	Acid phosphate, 240 lbs.; muriate potash, 90 lbs.; nitrate soda, 120 lbs.	343	3.17	—424	979	33.46	7.65	25.81	8
9	Acid phosphate, 400 lbs.; stable manure, 10 tons	336	4.99	661	1,948	39.32	8.00	31.32	9
10	None	...	...	...	...	...	...	...	...	...	10

VARIETY COMPARISONS

DEPARTMENT OF AGRONOMY

CORN

The variety corn test included 9 varieties in 1914. Eight of these varieties were tested in 1913, and 5 in 1912 and 1911. In 1914 the Boone County White was first and Darke County Mammoth, second. In 1913 the Clarage led slightly, with the Reid, second. Averaging the two years, Darke County Mammoth is first, with the Clarage, second, and the Reid, third.

TABLE IX: Variety corn test, Miami county.

Variety	Bushels of corn per acre			Av. yield of stover Lbs. per acre	4-year average yield per acre Bushels
	1914	1913	2-yr. av.		
Leaming	63.31	48.61	55.96	2,425	50.31
Clarage	63.12	59.91	61.51	2,050	52.84
White Cap	58.21	55.86	57.03	2,675	.....
Cook's 75	64.40	57.29	60.84	2,900	56.19
Reid (Orcutt)	62.93	59.84	61.38	2,800	.....
Ohio 84	61.09	47.60	54.34	2,400	46.46
Boone County White	67.95	.....	.....	3,500*	.....
Leaming—Cuppy	61.16	48.53	54.84	2,700	.....
Darke County Mammoth	65.55	58.39	61.97	2,950	57.91

*One year's record.

In the final column the yield of such varieties as have been tested the full time is given. In the case of the Clarage the yield is for 3 years, only.

OATS

The 1914 oats test included 7 varieties of oats, the Oderbrucker barley and emmer. The 1913 test was identical, and that for 1912 differed only in one variety of oats. As a 3-year average, the Big Four stands first in yield, with the Silvermine, second, closely followed by the Swedish Select and the Ohio 6203, a Siberian selection. The Ohio 6222, a selection of the Improved American, which led all the different varieties in 1914, was not tested in 1912. In 1912 another selection of the Improved American was used—Ohio 6143. A 3-year average of both selections of Improved American would place the latter second in rank.

To compare the yield of barley with the oats and emmer it should be noted that the barley is figured at 48 lbs. per bushel and the oats and emmer at 32 lbs.

TABLE X: Variety oats test, Miami county.

Variety	Bushels of oats per acre				Lbs. of straw per acre 3-yr. av.
	1914	1913	1912	3-yr. av.	
Big Four	48.60	62.99	78.17	63.25	2,625
Silvermine	44.38	61.07	77.76	61.07	2,288
Swedish Select	42.29	61.12	78.59	60.67	2,733
Ohio 7009 (Sixty Day)	48.75	44.14	74.21	55.70	1,660
Ohio 6203 (Siberian)	45.63	60.75	75.15	60.51	3,027
Ohio 6222 (Improved American)	54.38	51.85	.....	61.64	2,643
Ohio 6143 (Improved American)	.....	.....	78.70		
Wideawake	47.19	57.11	71.40	58.57	2,523
Oderbrucker barley	22.71	36.03	32.08	30.28	2,013
Emmer	35.78	61.56	35.94	44.43	2,228

WHEAT

Each year two different sets of plots are used in testing varieties of wheat. In one set wheat follows oats; in the other, tobacco. When the wheat following tobacco is planted in good time it outyields the other rotation. This was the case in 1913, when a selection of Poole wheat yielded over 55 bushels per acre. Since the same check variety (Velvet Chaff) is used in each rotation it is possible to put both series on the same basis for the sake of comparison. That is, it is possible to state with much accuracy what the varieties grown in the tobacco rotation would have yielded if grown in the other series. This has been done in the following table.

TABLE XI: Variety wheat test, Miami county.

Variety	Bushels of wheat per acre			Lbs. of straw per acre 1914
	1914	1913	2-yr. av.	
Fultz	31.27	35.55	33.41	2,800
Ohio 5309 (Fultz)	37.32	41.44	39.38	3,870
Ohio 8106 (Fultz)	34.15	36.83	35.49	3,380
Poole	34.99	38.50	36.74	3,090
Ohio 6400 (Poole)	35.11	49.44	42.27	2,750
Gypsy	35.37	39.32	37.34	3,060
Ohio 6100 (Gypsy)	35.42	43.85	39.63	3,325
Mediterranean	32.92	38.47	35.69	3,740
Rudy	33.76	43.22	38.49	3,240
Turkey Red	37.48	38.58	38.03	3,700
Valley	41.29	42.10	41.69	4,025
Goens	42.76	37.94	40.35	3,980
Nigger	36.54	42.94	39.74	3,430
Velvet Chaff	37.71	36.77	37.24	3,838

SOYBEANS

The variety test of soybeans the last two years has included 8 varieties, and the New Era cowpeas for comparison. The selection of yellow soys known as Ohio 7496 was highest in yield in 1913, with Ohio 9016, second. In 1914 the Mongol was first, leading Ohio 9035

by a small fraction of a bushel. As a 2-year average the Ohio 7496 is first, with Ohio 9035 second. The New Era cowpeas have a 2-year average yield of 9.02 bushels per acre, which is better than they have done elsewhere.

TABLE XII: Variety soybean test, Miami county.

Variety	Bushels per acre			Lbs. of straw per acre
	1914	1913	2-yr. av.	1914
Ohio 9100	22.00	12.81	17.40	2,255
Mongol	27.86	15.29	21.57	2,525
Chestnut	26.25	16.93	21.59	1,945
Ohio 9035	27.64	16.67	22.15	2,565
Ebony	19.66	15.62	17.64	2,255
Ohio 7496	26.56	20.26	23.41	2,885
Ohio 9016	23.61	17.12	20.36	2,485
Medium Green	23.00	15.81	19.40	2,020
New Era Cowpea	9.37	8.67	9.02	1,907

HARVESTING CROPS WITH SWINE

DEPARTMENT OF ANIMAL HUSBANDRY

In 1914 the plan to hog down the crops in the four-year rotation of corn, corn, rye and clover, and a plot devoted to continuous corn culture, was carried out, excepting that a part of the rye and one of the corn plots in the rotation were harvested because too small a number of pigs were available to hog down all three corn plots, a total of 9 acres, before winter began. Rye and clover were utilized as pasture for the sows and their litters, consisting of 35 pigs.

On July 16, 34 pigs were weighed and divided into 3 lots and fed as follows for 30 days, July 16 to August 15.

Lot 1. 12 pigs fed ear corn on clover pasture.

Lot 2. 12 pigs allowed to hog down rye.

Lot 3. 10 pigs fed ear corn on rape pasture.

In addition to the above rations all lots were fed approximately one-fourth of a pound of tankage daily per pig. The following is a summary of the results secured:

	Lot 1	Lot 2	Lot 3
Initial weight, July 16, 1914	872.	1096.	800.
Final weight, August 15, 1914	1168.	1301.	1025.
Total gain	296.	205.	225.
Average daily gain per pig	.82	.57	.75
Feed consumed, aside from pasture, per 100 lbs. gain	266.	634.4	291.2

Only one acre of the rye was hogged down, the other two acres in the plot were harvested and threshed, and the yield, 21.7 bushels per acre, was taken as a basis for estimating the amount of rye on the acre hogged down. The pigs on rape pasture were confined to one acre of rape, while those on clover had the run of three acres of clover.

On August 15, Lot 2, having cleaned up the rye, was turned on clover with Lot 1, where it remained until September 10. Lot 3, on rape pasture, was not disturbed, and the feed consumed and gains in weight by these two lots during this period of 26 days are shown in the following statement:

	Lot 1 24 pigs on clover pasture	Lot 2 10 pigs on rape pasture
Weight, August 15, 1914	2469.	1025.
Weight, September 10, 1914	2938.5	1251.
Total gain	469.5	226.
Average daily gain per pig	.75	.87
Feed consumed, aside from pasture, per 100 lbs. gain	363.89	316.4

Owing to the fact that no pigs were kept in dry lot and fed grain rations like those fed on pasture, there is no very definite basis for estimating the savings effected by the use of pasture. A good rate of gain was secured at a very low feed requirement except in hogging down rye, where the results do not indicate that this is a very profitable method of handling rye except under certain conditions. Rye used as a cover crop may frequently be further utilized as both fall and early spring pasture and, under circumstances that would make harvesting and threshing it inconvenient, may be allowed to mature and be hogged off with results perhaps similar to those shown in the table.

Two three-acre plots of corn were hogged down with 33 pigs. The following is a brief summary of the results.

Initial weight, September 10, 1914	4055.5	pounds
*Final weight, November 6, 1914	7171.	pounds
Total gain	3246.5*	pounds
Average daily gain per pig	1.76	pounds

*One pig died October 3, weight 131 lbs.

In addition to the standing corn, these pigs received 221 pounds of tankage while they were on the first plot hogged off. No tankage was fed while the second plot was being hogged off. Both plots had been seeded in rape at the rate of 3 pounds per acre at the last cultivation of the corn, and the stand secured was sufficient to supply more green feed than was consumed by the pigs while hogging off the corn.

A small portion of each plot was harvested, weighed and tested for moisture as a basis for estimating the yield of the plots. The average yield of the two plots was 48.3 bushels per acre, computed on a 15% moisture basis. The pigs showed a return of 65, 77 and 88 cents per bushel or $31.54, $36.95 and $42.37 per acre for the standing corn, with hogs at 6, 7 and 8 cents per pound, respectively, with no charge for labor. The cost of the tankage fed is deducted but all the profit is credited to standing corn and rape.

THE PAULDING COUNTY EXPERIMENT FARM

FOURTH ANNUAL REPORT, FOR 1914

C. E. THORNE

The first, second and third reports on the work of this farm were made in Bulletins 241, 258 and 273. The present report covers the calendar year, 1914.

When purchased, this farm was without buildings and was insufficiently drained. A barn 36x70 feet in size, a four-room cottage and an implement shed have been built. These buildings are not sufficient for the proper management of the farm. There should be another and larger house, to accommodate the farm superintendent, and there should be a stable in which to feed cattle or sheep during the winter. There should also be more drainage, although a considerable amount has been done.

PERSONNEL

Mr. C. Ellis Bundy was appointed County Agricultural Agent for Paulding county and superintendent of the experiment farm early in the year. Mr. A. E. Smith resigned the management of the farm in the spring of 1914, and Harry Ray was appointed foreman.

CROP ROTATION AND SOIL FERTILITY EXPERIMENTS

Three crop rotations are in progress on this farm, namely:

Rotation I: Corn, oats, wheat, clover.
Rotation II: Corn, soybeans, wheat, clover.
Rotation III: Sugar beets, oats, clover.

Rotation I is being conducted in duplicate, one set of plots being used in a test of fertilizers and manure, and another in a comparison of varieties.

Diagram II shows the arrangement of plots in these rotations. The scheme of fertilizing in the cereal rotations is shown in Table XIII. In the sugar beet rotation the fertilizers are all applied to the beet crop, as shown in Table XX.

The results of the fertility work to date are given in Tables XIV to XXVI.

TABLE XIII: Plan of fertilizing in cereal rotations, Paulding County Experiment Farm

Pounds of fertilizing materials per acre for each crop

Plot No.	Acid phosphate	Muriate potash	Nitrate soda	Additional treatment	Acid phosphate	Muriate potash	Nitrate soda	Acid phosphate	Muriate potash	Nitrate soda
	Rotation I: Corn, oats, wheat, clover									
	On corn				On oats			On wheat		
1	...	..	..	.....	...	..	..	...	..	..
2	200	..	.	. ....	100	..	..	200	..	..
3	200	50	..	.. ...	100	20		200	20	..
4	...	..	..	.....	...	..	..	...	..	..
5	200	50	50	.....	100	20	30	200	20	80
6	200	50	50	4,000	100	20	30	200	20	80
7	...	..	..	.....	. .	..	..	...	..	..
8	Manure, 8 tons		..	.....	. .	..	..	200	50	50
9	Manure, 8 tons, phosphated			.....	...	..	..	200	50	50
10	...	..	..	.....	.. .	..	..	...	..	..
	Rotation II: Corn, soybeans, wheat, clover									
	On corn				On soybeans			On wheat		
1	...	..	..	..	...	..	..	...	..	..
2	200	..	..	.	100	..	..	200	..	..
3	200	50	..	..	100	20	..	200	20	..
4	...	..	..	..	...	..	..	...	..	..
5	200	50	50	..	100	20	30	200	20	80
6	130	50	20	..	70	20	10	160	20	20
7	...	..	..	..	...	..	..	...	..	..
8	160	20	20	..	100	..	..	170	..	30
9	160	20	20	..	100	..	..	170	..	30
10	...	..	..	..	...	..	..	...	..	..

*Catch crop on corn.

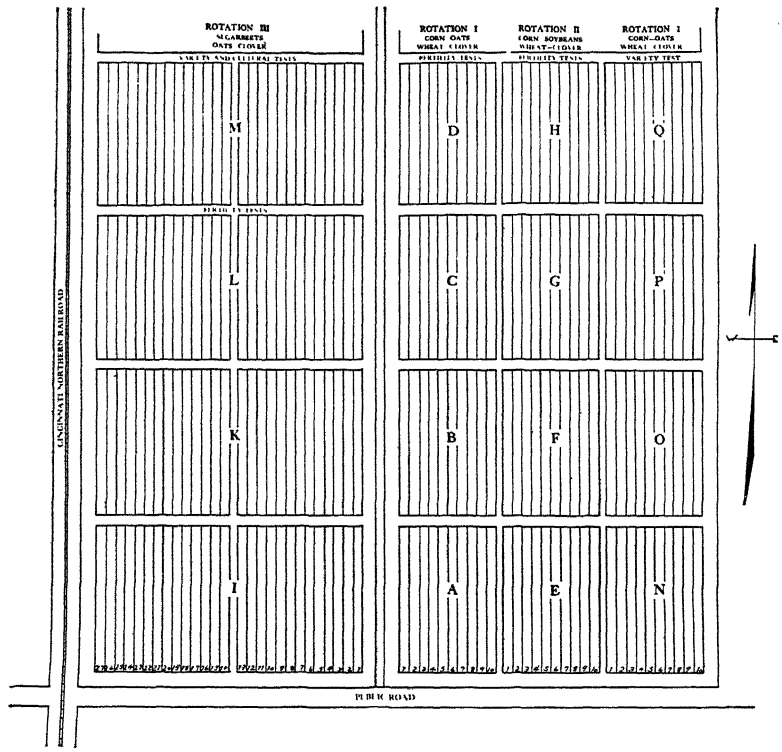


Diagram II: Arrangement of plots in rotative experiments
Paulding County Experiment Farm

TABLE XIV: Fertilizers and manure on CORN grown in rotation, Paulding County Experiment Farm

Plot No.	Treatment per acre	Yield per acre				Increase or decrease (—) per acre				Plot No.
		1914		3-yr. average		1914		3-yr. average		
		Grain Bus.	Stover Lbs.	Grain Bus.	Stover Lbs.	Grain Bus.	Stover Lbs.	Grain Bus.	Stover Lbs.	
	Rotation I: Corn-oats-wheat-clover									
1	None	43.36	3,100	50.10	3,567	....	...	....	...	1
2	Acid phosphate, 200 lbs.	37.00	2,900	46.00	3,633	—8.81	—367	—5.99	0	2
3	Acid phosphate, 200 lbs.; muriate potash, 50 lbs.	36.86	3,450	45.60	3,867	—11.40	17	—8.29	167	3
4	None	50.71	3,600	55.78	3,767	....	...	....	...	4
5	Acid phosphate, 200 lbs; muriate potash, 50 lbs.; nitrate soda, 50 lbs.	50.64	3,775	53.90	3,908	.69	192	—.50	208	5
6	Acid phos., 200 lbs.; mur. potash, 50 lbs.; nit. soda, 50 lbs.; sugar factory lime, 2 tons	45.64	3,900	47.33	3,883	—3.55	333	—5.69	250	6
7	None	48.43	3,550	51.64	3,567	....	...	....	...	7
8	Untreated manure, 8 tons	46.57	3,450	53.36	3,833	—2.17	—217	1.84	211	8
9	Phosphated manure, 8 tons	38.07	4,150	44.76	4,133	—10.98	367	—6.62	456	9
10	None	49.36	3,900	51.26	3,733	....	...	....	...	10
	Average unfertilized yield	47.96	3,537	52.19	3,658	....	...	....	...	
	Rotation II: Corn-soybeans-wheat-clover									
1	None	46.86	3,550	45.21	3,225	....	...	....	...	1
2	Acid phosphate, 200 lbs.	43.86	3,550	39.71	3,325	—3.07	—17	—5.21	175	2
3	Acid phosphate, 200 lbs.; muriate potash, 50 lbs.	39.71	3,650	39.07	3,425	—7.29	67	—5.57	350	3
4	None	47.07	3,600	44.35	3,000	....	...	....	...	4
5	Acid phosphate, 200 lbs.; muriate potash, 50 lbs.; nitrate soda, 50 lbs.	53.36	4,050	50.93	3,750	3.60	333	3.72	516	5
6	Acid phosphate, 130 lbs.; muriate potash, 50 lbs.; nitrate soda, 20 lbs.	45.21	3,750	47.28	3,375	—7.24	—83	—2.78	—91	6
7	None	55.14	3,950	52.92	3,700	....	...	....	...	7
8	Acid phosphate, 160 lbs.; muriate potash, 20 lbs.; nitrate soda, 20 lbs.*	48.79	4,050	47.21	3,550	—5.21	150	—4.94	16	8
9	Acid phosphate, 160 lbs.; muriate potash, 20 lbs,; nitrate soda, 20 lbs.*	44.29	3,750	44.46	3,650	—8.56	—100	—6.91	283	9
10	None	51.71	3,800	50.60	3,200	....	...	....	...	10
	Average unfertilized yield	50.20	3,725	48.28	3,281	....	...	....	...	

*Plots 8 and 9, Rotation II, are treated alike, except that catch crops follow corn on Plot 9.

TABLE XV: Fertilizers and manure on OATS grown in rotation, Paulding County Experiment Farm

Plot No.	Treatment per acre	Yield per acre				Increase or decrease (−) per acre				Plot No.
		1914		3-yr. average		1914		3-yr. average		
		Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.	
	Rotation I (Corn-oats-wheat-clover)									
1	None	42.19	2,100	45.47	2,995	....	.....	....	.....	1
2	Acid phosphate, 100 lbs	39.22	1,995	45.47	3,012	—1.56	—100	.24	—10	2
3	Acid phosphate, 100 lbs.; muriate potash, 20 lbs	46.87	2,025	49.58	2,558	7.49	—65	4.60	—491	3
4	None	37.97	2,085	44.74	3,077	....	.....	....	.....	4
5	Acid phosphate, 100 lbs.; muriate potash, 20 lbs.; nitrate soda, 30 lbs	43.44	2,060	50.00	2,692	5.84	80	5.75	—181	5
6	Acid phosphate, 100 lbs.; muriate potash, 20 lbs.; nitrate soda, 30 lbs	45.94	1,930	49.37	2,847	8.70	55	5.61	177	6
7	None	36.87	1,770	43.28	2,465	....	.....	....	.....	7
8	(Manured on corn)	39.22	1,795	43.23	2,675	1.52	60	*.86	*326	8
9	(Manured on corn)	37.97	1,735	41.98	2,232	—.57	35	*	*—416	9
10	None	39.37	1,665	44.27	2,750	....	.....	....	.....	10
	Average unfertilized yield	39.10	1,905	44.44	2,822	....	.....	....	.....	

*2-year averages.

TABLE XVI: Fertilizers on SOYBEANS at Paulding County Experiment Farm

Rotation II—Corn-soybeans-wheat-clover

Plot No.	Treatment per acre	1914				2-yr. average		Plot No.
		Yield per acre		Increase per acre				
		Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.	Yield per acre Bus.	Increase per acre Bus.	
	Rotation II (Corn-soybeans-wheat-clover)							
1	None	20.67	1,890	....	...	20.21	....	1
2	Acid phosphate, 100 lbs	21.25	1,945	.72	40	20.71	0.80	2
3	Acid phosphate, 100 lbs.; muriate potash, 20 lbs	21.00	1,970	.61	50	21.62	2.02	3
4	None	20.25	1,935	....	...	19.29	....	4
5	Acid phosphate, 100 lbs.; muriate potash, 20 lbs.; nitrate soda, 20 lbs	21.00	2,270	1.08	355	21.54	2.31	5
6	Acid phosphate, 70 lbs.; muriate potash, 20 lbs.; nitrate soda, 10 lbs	21.25	2,075	1.67	180	20.46	1.30	6
7	None	19.25	1,875	....	...	19.08	....	7
8	Acid phosphate, 100 lbs	21.08	1,885	1.58	—40	21.08	1.65	8
9	Acid phosphate, 100 lbs	20.50	2,050	.75	75	20.55	0.81	9
10	None	20.00	2,025	....	...	20.12	....	10
	Average unfertilized yield	20.04	1,981	....	..	19.67	....	

TABLE XVII: Fertilizers and manure on WHEAT grown in rotation at Paulding County Experiment Farm

Plot No.	Treatment	Yield per acre				Increase per acre				Plot No.
		1914		2-yr. average		1914		2-yr. average		
		Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs;	
	Rotation I: Corn-oats-wheat-clover									
1	None	32.83	2,880	41.08	*	....	...	....	*	1
2	Acid phosphate, 200 lbs	28.58	2,585	33.58	.....	—2.13	—81	—4.99	.....	2
3	Acid phosphate, 200 lbs.; muriate potash, 20 lbs	28.17	2,510	33.33	.....	—.41	59	—2.73	.....	3
4	None	26.46	2,237	33.56	.....	....	...	....	.....	4
5	Acid phosphate, 200 lbs.; muriate potash, 20 lbs.; nitrate soda, 80 lbs.	33.67	2,930	38.12	.....	7.95	715	5.15	.....	5
6	Acid phosphate, 200 lbs.; muriate potash, 20 lbs.; nitrate soda, 80 lbs.[1]	30.83	2,600	35.70	.....	5.84	408	3.32	.....	6
7	None	24.25	2,170	31.79	.....	....	...	....	.....	7
8	Acid phosphate, 200 lbs.; muriate potash, 50 lbs.; nitrate soda, 50 lbs.[2]	32.67	3,040	37.50	.....	7.92	792	5.47	.....	8
9	Acid phosphate, 200 lbs.. muriate potash, 50 lbs., nitrate soda, 50 lbs.[3]	31.42	2,640	35.42	.....	6.17	313	3.15	.....	9
10	None	25.75	2,405	32.50	.....	....	...	....	.....	10
	Average unfertilized yield	27.32	2,423	34.73	.....	....	...	....	.....	
	Rotation II: Corn-soybeans-wheat-clover									
1	None	39.00	3,660	39.83	.....	....	...	....	.....	1
2	Acid phosphate, 200 lbs	42.00	4,055	42.41	.....	2.78	333	2.58	.....	2
3	Acid phosphate, 200 lbs.; muriate potash, 20 lbs	43.00	4,220	42.33	.....	3.55	437	2.50	.....	3
4	None	39.67	3,845	39.83	.....	....	...	....	.....	4
5	Acid phosphate, 200 lbs.; muriate potash, 20 lbs.; nitrate soda, 80 lbs	45.67	4,560	45.81	.....	5.28	900	5.78	.....	5
6	Acid phosphate, 160 lbs.; muriate potash, 20 lbs.; nitrate soda, 20 lbs	44.17	4,700	41.60	.....	3.06	1.225	1.37	.....	6
7	None	41.83	3,290	40.43	.....	....	...	....	.....	7
8	Acid phosphate, 170 lbs.; nitrate soda, 30 lbs	45.50	5,095	43.58	.....	3.31	1,293	3.20	.....	8
9	Acid phosphate, 170 lbs.; nitrate soda, 30 lbs.[4]	46.17	5,130	41.67	.....	3.61	817	1.32	.....	9
10	None	42.92	4,825	40.29	.....	....	...	....	.....	10
	Average unfertilized yield	40.85	3,905	46.09	.....	....	...	....	.....	

[1]Lime carbonate on corn. [2]Untreated manure on corn. [3]Phosphated manure on corn. [4]Catch crop on corn.
*Wheat straw not reported for 1913.

TABLE XVIII: Residual effect on CLOVER of fertilizers applied to previous crops. Paulding County Experiment Farm, 1914

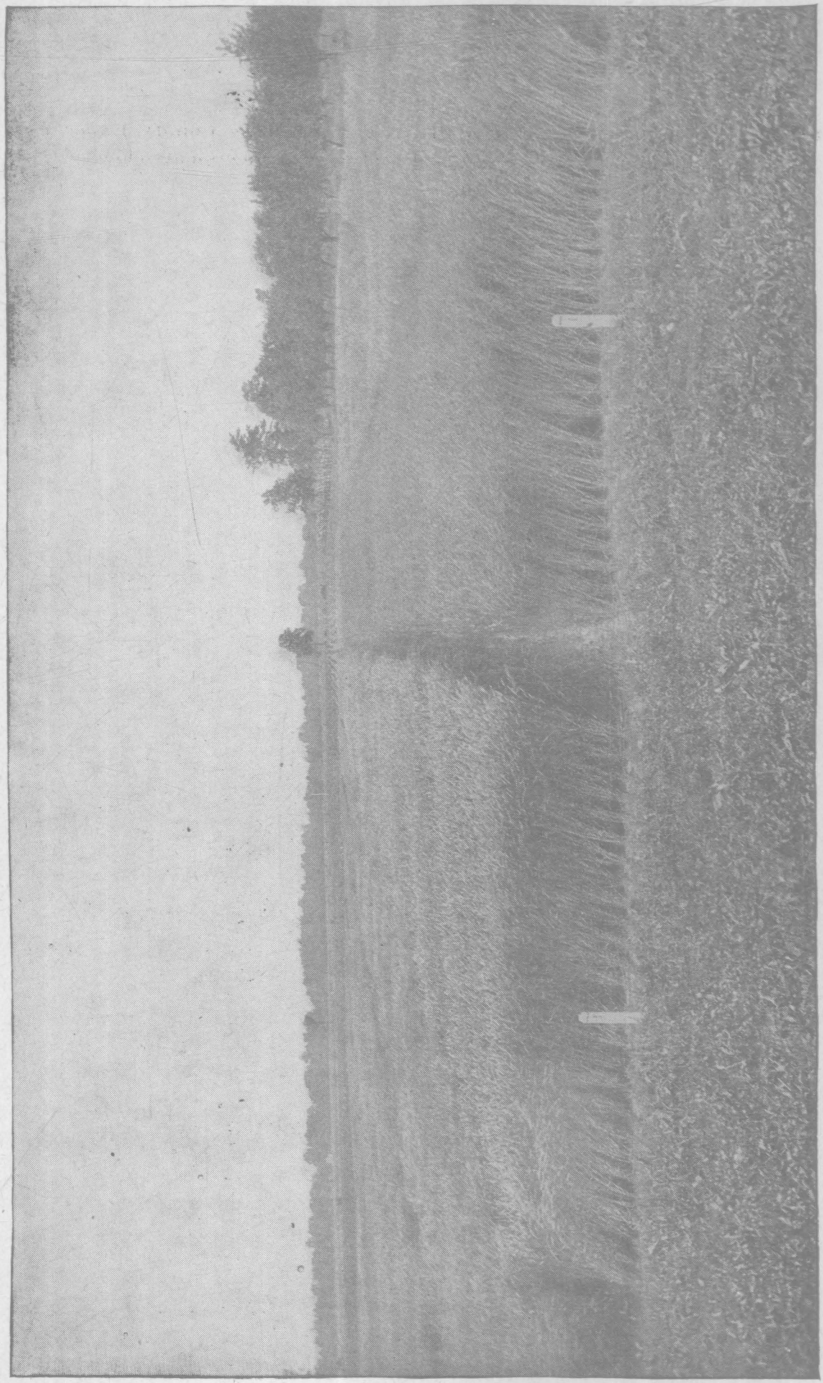
Plot No.	Rotation I						Rotation II						Plot No.
	Fertilizers per acre			Additional treatment	Yield per acre	Increase per acre	Fertilizers per acre			Additional treatment	Yield per acre	Increase per acre	
	Acid phosphate	Muriate potash	Nitrate soda				Acid phosphate	Muriate potash	Nitrate soda				
	Lbs.	Lbs.	Lbs.		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.		Lbs.	Lbs.	
1	...	..	..	..	3,982	...					4,604	...	1
2	500	..	..	..	4,444	124	500	..	..	..	4,818	149	2
3	500	90	..	..	4,889	231	500	90	..	..	4,756	21	3
4	...	..	..	..	4,996	...	...	..	..	..	4,800	..	4
5	500	90	160	..	5,111	188	500	90	160	..	5,067	74	5
6	500	90	160	a	4,844	—7	360	90	50	..	5,244	59	6
7	...	..	..	..	4,778	...	...	..	..	..	5,378	..	7
8	200	50	50	b	5,484	610	430	20	50	..	5,556	356	8
9	200	50	50	c	4,756	—215	430	20	50	d	4,844	—179	9
10	...	..	..	..	5,067	...	...	..	..	..	4,844	..	10
	Average unfertilized yields.....				4,716	...	...	..	...	..	4,907	...	

a Powdered limstone, 2 tons.
b Untreated manure, 8 tons.
c Phosphated manure, 8 tons.
d Catch crop after corn.

TABLE XIX: Fertilizers and manure on crops grown in rotation, Paulding County Experiment Farm. Average value of increase and cost of fertilizers per acre.

Plot No.	Fertilizers per acre for entire rotation; lbs.				Average increase or decrease (—) per acre							Total value of increase[7]	Total cost of fertilizer[8]	Plot No.
					Corn		Oats		Wheat		Clover			
	Acid phosphate	Muriate of potash	Nitrate of soda	Additional treatment	Grain Bus.	Stover Lbs.	Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.	Lbs.			
Rotation I: Corn-oats-wheat-clover														
1	...	..	...	....	....	...	....	....	....	...	...	....	....	1
2	500	..	...	....	—5.99	0	.24	—10	—4.99	—81	124	—$5.91	$3.50	2
3	500	90	...	....	—8.29	167	4.60	—491	—2.73	59	231	—3.38	5.75	3
4	...	..	...	....	....	...	....	....	....	...	...	....	....	4
5	500	90	160	....	—.50	208	5.75	—181	5.15	715	188	7.24	10.55	5
6	500	90	160	[1]	—5.69	250	5.61	177	3.32	408	—7	3.00	16.55	6
7	...	..	...	....	....	...	....	....	....	...	...	....	....	7
8	200	50	50	[2]	1.84	211	.86[5]	326	5.47	792	610	9.24	8.15	8
9	200	50	50	[3]	—6.62	456	0	—416	3.15	313	—215	—.41	10.40	9
10	...	..	...	....	....	...	....	...	....	...	...	....	....	10
Rotation II: Corn-soybeans-wheat-clover														
1	...	..	...	....	....	...	....	[6]	....	[6]	...	....	....	1
2	500	..	...	....	—5.21	175	.80	40	2.58	333	149	$2.81	$3.50	2
3	500	90	...	....	—5.57	350	2.02	50	2.50	437	21	4.93	5.75	3
4	...	..	...	....	....	...	....	....	....	...	...	....	....	4
5	500	90	160	....	3.72	516	2.31	355	5.78	900	74	13.30	10.55	5
6	360	90	50	....	—2.78	—91	1.30	180	1.37	1,225	59	4.18	6.27	6
7	...	..	..	....	....	...	....	....	....	...	...	....	....	7
8	430	20	50	....	—4.94	16	1.65	—40	3.20	1,293	356	6.56	5.00	8
9	430	20	50	[4]	—6.91	283	.81	75	1.32	817	—179	0.55	10.00	9
10	...	..	..	....	....	...	....	...	....	...	...	....	....	10

[1]Powdered limestone, 2 tons. [2]Untreated manure, 8 tons. [3]Phosphated manure, 8 tons. [4]Catch crop after corn. [5]Plots 8 and 9, increase for 2 years, [6]Soybean and wheat straw for 1914, only. [7]Computing corn at 40 cents per bushel, oats at 30 cents, wheat at 80 cents, stover at $3.00 per ton, straw at $2.00, and hay at $8.00. [8]Computing acid phosphate at $14.00 per ton, muriate of potash at 2½ cents per pound, nitrate of soda at 3 cents per pound, and manure at 50 cents per ton.



Paulding County Experiment Farm: Comparison of varieties of wheat, 1913

TABLE XX: Fertilizers on SUGAR BEETS at Paulding County Experiment Farm, 1914, and 3-year average. Rotation III—Beets-oats-clover.

Plot No	Treatment per acre	1914		3-year average	
		Yield per acre	Increase or decrease(−) per acre	Yield per acre	Increase or decrease(−) per acre
		Tons	Tons	Tons	Tons
1	None	9.200	.....	10.975	.....
2	Acid phosphate, 600 lbs	9.750	.733	11.267	.158
3	Muriate potash, 200 lbs	7.400	—1.433	8.850	—2.392
4	None	8.650	.....	11.375	.....
5	Nitrate soda, 200 lbs	8.900	1.200	11.708	.958
6	Acid phosphate, 600 lbs. Nitrate soda, 200 lbs	6.850	.100	11.308	1.183
7	None	5.800	.....	9.500	.....
8	Acid phosphate, 600 lbs. Muriate potash, 200 lbs.	7.675	1.933	11.825	2.625
9	Muriate potash, 200 lbs. Nitrate soda, 200 lbs.	5.700	.017	11.083	2.183
10	None	5.625	.....	8.600	.....
11	Acid phosphate, 600 lbs. Muriate potash, 200 lbs. Nitrate soda, 200 lbs.	9.600	3.217	13.600	4.411
12	Acid phosphate, 600 lbs. Muriate potash, 200 lbs. Nitrate soda, 200 lbs. Sugar factory lime, 2 tons.	8.900	1.758	13.058	3.280
13	None	7.900	.....	10.367	.....
14	Sugar factory lime, 2 tons	5.800	—2.250	10.200	—.045
15	Floats, 1200 lbs	7.300	—.900	10.183	.061
16	None	8.350	.....	10.000	.....
17	Yard manure, 10 tons	9.400	1.750	10.667	.819
18	Fresh manure, 10 tons	9.500	2.550	12.058	2.364
19	None	6.250	.....	9.542	.....
20	Fresh manure, 10 tons. Sugar factory lime, 2 tons.	8.300	.867	11.192	1.018
21	Fresh manure, 10 tons. Acid phosphate, 300 lbs.	7.300	—1.317	12.092	1.286
22	None	9.800	.....	11.962	.....
23	Mixed fertilizer, 2-8-2, 500 lbs	8.700	—.817	11.387	—.346
24	Acid phosphate, 287 lbs. Muriate potash, 20 lbs. Nitrate soda, 52 lbs.	8.700	—.533	11.350	—.154
25	None	8.950	.....	11.275	.....
26	Acid phosphate, 300 lbs. Muriate potash, 100 lbs. Nitrate soda, 100 lbs.	8.350	—.600	11.250	—.025
27	Steamed bonemeal, 175 lbs. Muriate potash, 100 lbs. Nitrate soda, 67 lbs.	11.100	2.150	12.737	1.462
	Average unfertilized yields	7.836	.....	10.414	.....

TABLE XXI: Residual effect on oats and clover of fertilizers applied to sugar beets at Paulding County Experiment Farm.

Rotation III (Beets-oats-clover)

Plot No.	Treatment of beet crop	Oats								Clover				Plot No.
		Yield per acre				Increase or decrease (—) per acre				Yield per acre		Increase or decrease (—) per A		
		1914		3 yr. average*		1914		3-yr. average*		1914	2-yr. av.	1914	2-yr. av.	
		Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
1	None	25.78	3,425	47.97	4,048	.....	.....	....	.....	9,450	8,414	.....	.....	1
2	Acid phosphate, 600 lbs	24.22	2,155	42.97	2,835	—1.77	—1,213	—4.06	—994	8,350	7,864	—1,085	—531	2
3	Muriate potash, 200 lbs	23.59	1,670	43.07	3,263	—2.61	—1,642	—3.02	—347	9,070	7,907	—350	—469	3
4	None	26.41	3,255	43.82	3,392	.....	.....	....	.....	9,405	8,358	.....	.....	4
5	Nitrate soda, 200 lbs	18.59	2,185	42.24	4,075	—7.45	—598	—1.82	893	8,550	7 853	—503	—177	5
6	Acid phosphate, 600 lbs.; nitrate soda, 200 lbs.	27.97	2,730	45.11	3,105	2.29	418	2.14	132	7,250	7,069	—1,452	—633	6
7	None	25.31	1,840	41.87	2,763	.....	.....	....	.....	8,350	7,375	.....	.....	7
8	Acid phosphate, 600 lbs.; muriate potash, 200 lbs.	29.53	2,485	46.82	3,512	4.69	688	5.12	810	8,800	7,422	400	325	8
9	Muriate potash, 200 lbs.; nitrate soda, 200 lbs.	23.44	2,125	43.12	3,703	—.94	372	1.59	1,065	8,650	7,258	200	441	9
10	None	23.91	1,710	41.36	2,577	.....	.....	....	.....	8,500	6,539	.....	.....	10
11	Acid phos., 600 lbs.; mur. pot., 200 lbs.; nit. soda, 200 lbs.	29.69	1,980	43.96	3,695	5.05	225	2.62	867	10,000	9,478	1,850	2,403	11
12	Acid phos., 600 lbs.; mur. pot.; 200 lbs.; nit. soda, 200 lbs., sugar factory lime, 2 tons	29.69	2,100	47.14	3,542	4.33	300	5.82	463	7,380	6,412	—420	—1,199	12
13	None	26.09	1,845	41.30	3,330	.....	.....	....	.....	7,450	8,147	.....	.....	13
14	Sugar factory lime, 2 tons	24.69	1,960	32.73	2,102	1.10	285	1.12	—26	6,450	6,291	—840	—1,175	14
15	Floats, 1,200 lbs	31.56	2,590	47.61	3,853	10.47	1,085	7.44	998	8,750	9,097	1,620	2,310	15
16	None	18.59	1,335	39.60	2,618	.....	.....	....	.....	6,970	6,107	.....	.....	16
17	Yard manure, 10 tons	23.91	2,385	34.22	2,780	3.55	760	5.03	851	7,930	8,820	843	2,099	17
18	Fresh manure, 10 tons	21.72	2,285	31.72	2,225	—.42	370	1.61	—48	7,650	6,991	447	—343	18
19	None	23.91	2,205	31 01	2,617	.....	.....	....	.....	7 320	7,949	.....	.....	19
20	Fresh manure, 10 tons.; sugar factory lime, 2 tons	24.69	2,340	33.44	2,370	.66	52	3.12	—116	7,880	6,906	300	—706	20
21	Fresh manure, 10 tons.; acid phosphate, 300 lbs.	24.69	2,435	32.81	2,787	.53	63	3.18	431	7,900	6,772	60	—503	21
22	None	24.28	2,455	28.93	2,225	.....	.....	....	.....	8,100	6,939	.....	.....	22
23	Mixed fertilizer, 2-8-2, 500 lbs	29.37	2,360	33.59	2,625	3.65	—38	3.41	282	8,680	7,106	863	435	23
24	Acid phos., 287 lbs.; mur. pot., 20 lbs.; nit. soda, 52 lbs.	28.59	2,315	32.50	2,175	1.44	—27	1.08	—287	7,270	6,313	—263	—90	24
25	None	28.59	2,285	32.65	2,580	.....	.....	....	.....	7,250	6,136	.....	.....	25
26	Acid phos., 300 lbs.; mur. pot., 100 lbs.; nit. soda, 100 lbs.	25.47	2,415	32.42	2,302	—3.12	130	—.23	—227	7,180	6,390	—70	254	26
27	Steamed bonemeal, 175 lbs.; mur. pot., 100 lbs., nit. soda, 67 lbs	27.81	2,010	32.11	2,497	—.78	—275	—.54	—82	7,000	6,344	—250	208	27
	Average unfertilized yield	24.76	2,262	42.58	3,191	.....	.....	....	.....	8,088	7,329	.....	.....	

*The average yields and increases for plots 14 to 27, inclusive, rotation III, are for two years, 1913 and 1914.

TABLE XXII: Fertilizers, manure and lime on sugar beets, oats and clover grown in rotation, Paulding County Experiment Farm. Average value of increase, cost of fertilizers and net gain or loss (—) per acre.

Plot No.	Treatment of beet crop	Average increase per acre				Total value of increase	Total cost of fertilizers	Net gain	Plot No.
		Sugar beets	Oats		Clover				
		Tons	Grain Bus.	Straw Lbs.	Lbs.				
1	None								1
2	Acid phosphate, 600 lbs	0.158	—4.06	—994	—531	— $3.53	$4.20	—$7.61	2
3	Muriate of potash, 200 lbs	—2.392	—3.02	—347	—469	—15.10	5.00	—9.82	3
4	None								4
5	Nitrate of soda, 200 lbs	0.958	—1.82	893	—177	4.43	6.00	—1.31	5
6	Acid phosphate, 600 lbs.; nitrate of soda, 200 lbs	1.183	2.14	132	—633	4.16	10.20	—5.91	6
7	None								7
8	Acid phosphate, 600 lbs.; muriate of potash, 200 lbs	2.625	5.12	810	325	16.77	9.20	7.57	8
9	Muriate of potash, 200 lbs.; nitrate of soda, 200 lbs	2.183	1.59	1,065	441	14.32	11.00	3.32	9
10	None								10
11	Acid phosphate, 600 lbs.; muriate of potash, 200 lbs.; nitrate of soda, 200 lbs	4.411	2.62	867	2,403	33.32	15.20	18.12	11
12	Acid phos., 600 lbs.; mur. potash, 200 lbs.; nit. soda, 200 lbs.; sugar factory lime, 2 tons	3.280	5.82	463	—1,199	13.81	18.20	—4.39	12
13	None								13
14	Sugar factory lime, 2 tons	—0.045	1.12	—26	—1,175	—4.61	3.00	—7.61	14
15	Floats, 1,200 lbs	0.061	7.44	998	2,310	12.77	6.00	6.77	15
16	None								16
17	Yard manure, 10 tons	0.819	5.03	851	2,099	14.85	5.00	9.85	17
18	Fresh manure, 10 tons	2.364	1.61	—48	—343	10.88	5.00	5 88	18
19	None								19
20	Fresh manure, 10 tons; sugar factory lime, 2 tons	1.018	3.12	—116	—706	3.09	8.00	—4.91	20
21	Fresh manure, 10 tons; Acid phosphate, 300 lbs	1.286	3.18	431	—503	5.80	4.60	1.20	21
22	None								22
23	Mixed fertilizer, 2-8-2, 500 lbs	—0.346	3.41	282	435	1.31	5.40	—4.09	23
24	Acid phosphate, 287 lbs.; muriate of potash, 20 lbs.; nitrate of soda, 52 lbs	—0.154	1.08	—287	—90	—1.09	4.07	—5.16	24
25	None								25
26	Acid phosphate, 300 lbs.; muriate of potash, 100 lbs.; nitrate of soda, 100 lbs	—0.025	—0.23	—277	254	0.54	7.60	—7.06	26
27	Steamed bonemeal, 175 lbs.; muriate of potash, 100 lbs.; nitrate of soda, 67 lbs	1.462	—0.54	—82	208	8.00	7.00	—1.00	27

Prices used in computing value of increase and cost of treatment: Sugar beets, $5.00 per ton; 2-8-2 fertilizer, $21.60 per ton; steamed bonemeal, $28.80 per ton; muriate of potash, 2½c per lb.; nitrate of soda, 3c per lb.; acid phosphate, $14 per ton; floats, $10 per ton; manure 50c per ton, and sugar factory lime, $1.50 per ton.

VARIETY COMPARISONS

DEPARTMENT OF AGRONOMY

CORN

In 1914, 9 varieties of corn were tested. Three of these were local strains of well-known varieties. Only 11 plots were available for variety testing. Three of these plots were devoted to the check variety—the Darke County Mammoth. The average yield of the check plots is recorded. Wheeler's Reid stood highest in yield in 1914, with Wheeler's Clarage, second. As a three-year average, Wheeler's Clarage is first, with Cook's 75, second.

TABLE XXIII: Variety corn test, Paulding county.

Variety	Yield per acre 1914		3-year average yield per acre
	Bushels	Lbs. Stover	Bushels
Reid (Morrisy)	49.22	4,475	44.46
Reid (Orcutt)	54.97	3,950	48.33
Reid (Wheeler)	67.53	3,750	50.42
Cook's 75	58.27	4,100	51.72
Ohio 84	48.22	3,600	48.38*
Clarage (Wheeler)	61.72	4,000	53.82
Leaming	45.65	3,325	46.08
Leaming-Cuppy	53.72	3,500	.....
Darke County Mammoth (Check)	52.36	4,303	47.58

*2-Year average yield.

OATS

The 1914 oats test included 8 varieties and one of barley. The same varieties of oats were tested in 1913 and 1912, but the Oderbrucker barley has been tested only one season. A local variety of oats known as the Little White was first in 1914, as also in the 3-year average; in the latter it leads by only 0.83 bushel.

TABLE XXIV: Variety oats test, Paulding county.

Variety	1914 Yield Bushels	3-year av. yield per acre	
		Bushels	Lbs. of Straw
Big Four	48.29	54.12	1,983
Silvermine	37.76	48.89	2,150
Swedish Select	42.76	46.27	2,872
Little White (local)	57.14	56.76	2,665
Ohio 7009 (Sixty Day)	36.03	47.68	2,122
Ohio 6203 (Siberian)	46.11	48.62	2,190
Ohio 6222 (Improved American)	53.06	55.93	2,645
Wideawake (Check)	42.60	48.52	2,693
Oderbrucker Barley	26.56	.....	1,025*

*One year's test

The "Ohio" varieties are descended from single heads of the varieties indicated. They have been sorted out from large numbers tested in head-row work and have shown superiority in yield and other characters over the original, or bulk variety.

WHEAT

Nine varieties of winter wheat have been tested the two seasons 1913 and 1914. A variety known as Ohio 6400, a head selection of Poole, stands highest in yield as a 2-year average, with Ohio 5309, a Fultz selection, second, and Ohio 6100, a Gypsy selection, third. These three selections led in 1914, though in slightly different order.

TABLE XXV: Variety wheat test, Paulding county.

Variety	Yield per acre 1914		2-year average yield per acre
	Bushels	Lbs. Straw	Bushels
Nigger	35.91	6,000	42.57
Ohio 6100 (Gypsy)	37.43	6,425	43.08
Mediterranean	29.62	4,900	34.96
Rudy	32.64	4,820	38.22
Turkey Red	35.81	5,100	40.41
Ohio 5309 (Fultz)	39.29	5,875	43.20
Ohio 6400 (Poole)	38.44	5,250	46.64
Goens	33.58	5,750	36.31
Velvet Chaff (Check)	33.08	5,158	37.64

SOYBEANS

For the past two seasons, 8 varieties of soybeans and one variety of cowpeas have been tested on this farm. The New Era cowpeas are reported a failure in 1913 and "not mature enough to thresh," in 1914. The Chestnut soybeans excel in yield as a 2-year average, with the Ohio 9035, second.

TABLE XXVI: Variety soybean test, Paulding county.

Variety	Color of beans	Yield per acre 1914		2-year average yield per acre
		Beans Bushels	Straw Lbs.	Bushels
Mongol	Yellow	15.54	1,965	17.37
Ebony	Black	15.95	1,685	18.14
Chestnut	Yellow	21.51	2,300	25.00
Ohio 9100	Yellow	15.18	2,430	18.78
Ohio 9116	Yellow	18.24	2,330	17.50
Ohio 7496	Yellow	20.73	2,180	19.95
Ohio 9035	Brown	23.87	2,595	22.42
Medium Green	Green	13.79	1,933	14.38

THE CLERMONT COUNTY EXPERIMENT FARM

THIRD ANNUAL REPORT, FOR THE YEAR 1914

C. E. THORNE

The first report on the Clermont county experiment farm was made in Bulletin 241, and the second in Bulletin 275.

No changes in the personnel of the farm have been made, Mr. Victor Herron having general superintendence, with Mr. Howard Elliott as Resident Manager.

The work of equipping the farm for its purpose has been pushed forward as fast as the limited means at command would permit. The condition of the land was such that no hope could be entertained of achieving useful results from field experiments without first draining it, and drainage is expensive work.

Of the two outstanding needs of this farm and of a very large territory in northern Clermont, Brown and Adams and southern Highland and Warren counties, it is difficult to say which is the greater, plant food or drainage, and therefore two parallel lines of experiment with fertilizers, lime and manure on crops grown in rotation have been instituted, the land being thoroughly tile-drained for the one and left undrained for the other.

The plan of these experiments is given in Table I and the results obtained on the drained land in Tables XXVII to XXX, the work on the undrained land not having been begun until 1914.

Except in the case of the soybeans the results attained in this Clermont county experiment are fairly consistent, and show that the land is very deficient in all the elements of fertility.

The average unfertilized yields of 16.15 bushels of corn, 8.5 bushels of soybeans, 5.69 bushels of wheat and 331 pounds of clover hay per acre certainly leave abundant room for improvement, but the increases resulting from the treatment indicate that after the draining, liming and fertilizing have had time to produce their full effect a very different outcome may be expected.

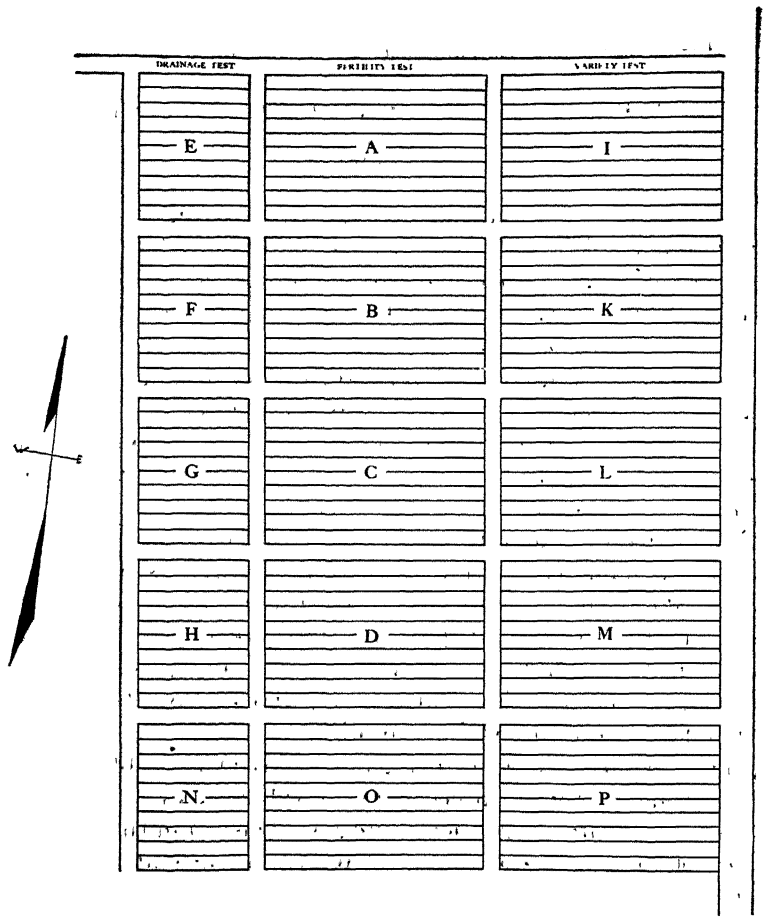


Diagram III: Arrangement of plots at Clermont County Experiment Farm.
Blocks A, B, C, D. Fertility tests on drained land
Blocks E, F, G, H. Fertility tests on undrained land
Blocks I, K, L, M. Variety tests (drained land).
Blocks N, O, P, additional tests

TABLE XXVII: Fertilizers, manure and lime on CORN at Clermont County Experiment Farm.

Plot No.	Treatment per acre	Yield per acre				Increase or decrease (−) per acre				Plot No.
		1914		3-year av.		1914		3-year av.		
		Grain Bus.	Stover Lbs.	Grain Bus.	Stover Lbs.	Grain Bus.	Stover Lbs.	Grain Bus.	Stover Lbs.	
	Rotation I—Corn-soybeans-wheat-clover. Drained land.									
1	None	13.71	1,000	18.28	1,033	....	...	....	...	1
2	Acid phosphate, 200 lbs.	19.00	1,150	20.24	1,147	6.48	190	2.59	118	2
3	Acid phosphate, 200 lbs; muriate of potash, 50 lbs.	20.00	1,250	22.33	1,283	8.67	330	5.32	259	3
4	None	10.14	880	16.38	1,020	....	...	....	...	4
5	Acid phosphate, 200 lbs.; muriate of potash, 50 lbs.; nitrate of soda, 50 lbs	21.71	1,120	27.00	1,333	9.76	117	10.45	302	5
6	Acid phos., 200 lbs.; mur. potash, 50 lbs.; nit. soda, 50 lbs.; powdered limestone, 2 tons.	21.71	1,300	27.71	1,377	7.95	173	10.98	334	6
7	None	15.57	1,250	16.90	1,053	....	...	....	...	7
8	Phosphated manure, 8 tons.	30.00	1,400	29 71	1,430	16.00	150	14.09	400	8
9	Phosphated manure, 8 tons; powdered limestone, 2 tons.	30.43	1,700	31.95	1,567	18.00	450	17.62	560	9
10	None	10.86	1,250	13.05	983	.....	...	.....	...	10
	Average unfertilized yield	12.57	1,095	16.15	1,022	.....	...	.. ..	...	
	Rotation II (Corn-soybeans-wheat-clover) Undrained land									
1	None	19.29	750	....	....	....	...	....	...	1
2	Acid phosphate, 200 lbs.	19.29	950	....	....	−0.14	183	....	...	2
3	Acid phosphate, 200 lbs.; muriate potash, 50 lbs.	20.14	1,000	....	...	0.57	217	....	...	3
4	None	19.71	800	....	....	....	...	....	...	4
5	Acid phosphate, 200 lbs.; muriate potash, 50 lbs.; nitrate soda, 50 lbs.	17.14	950	....	. .	−0.10	200	. .	...	5
6	Acid phos., 200 lbs.; mur. potash, 50 lbs.; nit. soda, 50 lbs.; powdered limestone, 2 tons.	17.86	800	....	....	3.10	100	....	...	6
7	None	12.29	650	..	...	....	...	....	...	7
8	Phosphated manure, 8 tons.	20.14	1,100	...	. ..	8.71	400	..	...	8
9	Phosphated manure, 8 tons; powdered limestone, 2 tons.	20.14	1,150	....	....	9.57	400	....	...	9
10	None	9.71	800	....	....	....	...	....	...	10
	Average unfertilized yield	15.25	750	....	....	....	...	....	...	

TABLE XXVIII: Fertilizers, manure and lime on SOYBEANS at Clermont County Experiment Farm.

Rotation I—Corn-soybeans-wheat-clover. Drained land.

Plot No.	Treatment per acre	Yield per acre		Increase or decrease (—) per acre		Plot No.
		1914 Bus.	2-year average Bus.	1914 Bus.	2-year average Bus.	
1	None	19.17	11.67	....	....	1
2	Acid phosphate, 100 lbs	19.17	12.08	1.67	1.19	2
3	Acid phosphate, 100 lbs.; muriate potash, 20 lbs	14.50	10.08	—1.34	—0.03	3
4	None	14.17	9.33	....	....	4
5	Acid phosphate, 100 lbs.; muriate potash, 20 lbs,; nitrate soda, 30 lbs	21.67	13.42	8.78	4.78	5
6	Acid phosphate, 100 lbs.; muriate potash, 20 lbs.; nitrate soda, 30 lbs	31.17	18.33	19.56	10.39	6
7	None	10.33	7.25	....	....	7
8	(Phosphated manure on corn)	10.83	8.08	1.44	1.33	8
9	(Phosphated manure and powdered limestone on corn)	16.67	11.17	8.23	4.92	9
10	None	7.50	5.75	....	....	10
	Average unfertilized yield	12.79	8.50	....	....	

TABLE XXIX: Fertilizers and manure on WHEAT at Clermont County Experiment Farm.

Rotation I—Corn-soybeans-wheat-clover. Drained land.

Plot No.	Treatment per acre*	Yield per acre				Increase or decrease (—) per cre				Plot No.
		1914		2-year average		1914		2-year average		
		Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.	
1	None	3.00	370	4.58	490	....	...	....	....	1
2	Acid phosphate, 200 lbs	7.67	440	10.00	830	4.00	—23	5.05	295	2
3	Acid phosphate, 200 lbs.; muriate potash, 20 lbs	8.83	620	11.00	940	4.50	63	5.69	360	3
4	None	5.00	650	5.66	625	....	...	....	....	4
5	Acid phosphate, 200 lbs.; muriate potash, 20 lbs.; nitrate soda, 80 lbs	12.83	1,480	14.83	1,650	7.83	857	8.77	1,010	5
6	Acid phosphate, 200 lbs.; muriate potash, 20 lbs.; nitrate soda, 80 lbs	13.33	1,580	14.66	1,625	8.33	983	8.22	970	6
7	None	5.00	570	6.83	670	....	...	....	....	7
8	Acid phosphate, 200 lbs.; muriate potash, 50 lbs.; nitrate soda, 50 lbs	13.50	1,740	12.91	1,505	8.61	1,120	6.47	831	8
9	Acid phosphate, 200 lbs.; muriate potash, 50 lbs.; nitrate soda, 50 lbs	16.67	1,900	13.92	1,540	11.89	1,230	7.86	863	9
10	None	4.67	720	5.67	680	....	...	....	....	10
	Average unfertilized yield	4.42	577	5.69	616	....	...	....	....	

*See Tables XXVII and XXVIII for additional treatment.

TABLE XXX: Fertilizers and manure on crops grown in rotation at the Clermont County Experiment Farm. Rotation I—Corn-soybeans-wheat-clover, drained land. Yield and increase of clover for 1914 and total value of increase, cost of treatment and net gain per acre for entire rotation.

Plot No.	Total fertilizing materials per acre as applied to crops preceding clover	Clover, 1914		Total value of increase	Total cost of fertilizers	Net gain
		Yield Lbs.	Increase Lbs.			
1	None	240	...	...	...	...
2	Acid phosphate, 500 lbs.	453	216	$8.79	$3.50	5.29
3	Acid phosphate, 500 lbs.; muriate of potash, 90 lbs.	836	602	9.77	5.75	4.02
4	None	231	...	...	...	...
5	Acid phosphate, 500 lbs.; muriate potash, 90 lbs.; nitrate soda, 160 lbs.	818	507	24.25	10.55	13.70
6	Acid phos., 500 lbs.; mur. potash, 90 lbs.; nitrate soda, 160 lbs.; powdered limestone, 2 tons.	667	276	34.32	16.55	17.77
7	None	471	...	...	...	.....
8	Phosphatedmanure, 8 tons; acid phosphate, 200 lbs.; mur. potash, 50 lbs.; nit. soda, 50 lbs.	1,431	990	18.86	10.40	8.46
9	Phosphated manure, 8 tons; acid phosphate, 200 lbs. muriate potash, 50 lbs.; nitrate of soda, 50 lbs.; powdered limestone, 2 tons	1,271	859	28.35	16.40	11.95
10	None	382	...	.....	.....	.....
	Average unfertilized yield	331	...	.....	.....	.....

The statistics of crop production in Ohio, as collected by the township assessors, show that for the 10 years, 1900-1909, the average acreage and yields per acre of crops in Clermont county with their values, computing corn at half a dollar per bushel, oats at one-third of a dollar, wheat at one dollar and hay at ten dollars per ton, were as follows:

Crop	Acres	Yield per acre	Value per acre
Corn	36,781	24.8 bus.	$12.40
Oats	9,836	20.1 bus.	6.70
Wheat	12,874	11.1 bus.	11.10
Meadows	24,662	.76 ton	7.60
Clover	3,171	.86 ton	8.60

The average yield of oats in Clermont county for the 50 years during which a record has been kept of this crop has been but 19 bushels per acre. This half century of experience, confirmed as it is by similar experience throughout the southern third of Ohio, should be sufficient evidence that the soil or climate, one or both, of this region are not adapted to the profitable production of oats, and that it is a waste of energy to continue growing it. During the same period that oats has averaged 19 bushels per acre in Clermont county it has averaged 35 bushels in Wayne, with similar yields throughout the northern third of the state.

The soybean has demonstrated its adaptability to the soil and climate of Ohio, especially to the southern half of the state. It is as easily grown as oats, and while it does not produce as many bushels per acre the value of its grain is so much greater than that of oats as to make it a much more profitable crop than oats where the climatic conditions are suited to its growth.

On the Clermont county experiment farm, in the two years' experiments thus far completed, soybeans have averaged 8.5 bushels per acre on unfertilized and unmanured land, as against 5.69 bushels for wheat and 16.15 bushels for corn under the same conditions. At $2.00 per bushel for soybeans, 75 cents for corn and a dollar and a half for wheat these crops would have been worth respectively $17.00, $12.00 and $8.50 per acre. On the land treated with phosphated manure, limestone and fertilizers, the treatment all being given to the corn and wheat, the soybeans yielded 11.17 bushels per acre, the corn 31.95 bushels and the wheat 13.92 bushels, or values of $22.34, $23.96 and $20.88, respectively.

Of course the price of soybeans will fall when they are more generally grown; but at a dollar per bushel, soybeans would probably be a more profitable crop in Clermont county than wheat at the same price, and very much more profitable than oats; but it is likely

to be a long time before soybeans are sold in Ohio at as low a price as a dollar per bushel, for the soybean is not only a very valuable feeding stuff because of its high percentage of protein, but it is nearly as rich in oil as cottonseed, and is extensively grown in the Orient for this purpose, and also as a human food.

Thus far the soybean is exceptionally free from insect and fungous troubles. Like other legumes, it is a nitrogen gatherer, and thus is especially indicated for the recuperation of impoverished soils, and wheat has been found to yield much better after soybeans than after oats or corn. In our judgment it is worth while for the Clermont county farmer to get acquainted with the soybean.

VARIETY COMPARISONS

DEPARTMENT OF AGRONOMY

CORN

Seven varieties of corn have been tested for two seasons. The yields have been very low, owing to the exhausted condition of the land. The Darke County Mammoth was highest in yield in 1913, with Leaming, second. In 1914, Reid was first, with Leaming-Cuppy second. As a two-year average, Reid stands first and Leaming-Cuppy second, though there is less than one bushel difference in yield in five candidates for second place.

TABLE XXXI: Variety corn test, Clermont county.

Variety	Bushels of corn per acre			Lbs. of stover per acre
	1914	1913	2-year av.	
Leaming	34.62	29.83	32.22	1,375
Clarage	35.90	28.71	32.30	1,485
White Cap	26.23	29.69	27.96	1,475
Cook's 75	37.47	28.02	32.74	1,465
Reid (Orcutt)	40.72	29.30	35.01	1,680
Leaming-Cuppy	37.88	28.11	32.99	1,395
Darke County Mammoth	33.85	31.74	32.79	1,325

OATS

Six varieties of oats were tested in 1913 and 7 in 1914. The yields of grain and straw are very low, due in part to low fertility, but perhaps more to climatic conditions. The Big Four was first in yield in 1913 and the Silvermine second. In 1914 a selection of Sixty Day—No. 7009, yielded highest by quite a margin, with the Silvermine and Big Four running close for second place.

TABLE XXXII: Variety oats test, Clermont county.

Variety	Bushels of oats per acre			Lbs. of straw per acre
	1914	1913	2-yr. average	
Big Four	16.87	16.48	16.67	865
Silvermine	16.98	15.13	16.05	700
Swedish Select	10.84	4.61	7.72	890
Ohio 7009 (Sixty Day)	23.43	.....	.....	590
Ohio 6203 (Siberian)	12.18	9.40	10.79	900
Ohio 6222 (Improved American)	6.87	10.96	8.91	765
Wideawake	16.25	12.11	14.18	900

WHEAT

A variety test of wheat was harvested in 1914 which included 7 varieties. Ohio 6400 (Poole) was first in yield, Mediterranean, second, and Rudy a close third.

TABLE XXXIII: Variety wheat test, Clermont county.

Variety	Yield per acre 1914	
	Bushels	Lbs. of straw
Nigger	13.74	1,380
Mediterranean	14.92	1,850
Rudy	14.42	1,670
Turkey Red	8.47	1,260
Ohio 6100 (Gypsy)	13.57	1,790
Ohio 6400 (Poole)	19.53	1,080
Velvet Chaff	13.58	1,725

THE HAMILTON COUNTY EXPERIMENT FARM

THIRD ANNUAL REPORT, FOR THE YEAR 1914

C. E. THORNE

The first report on the Hamilton County Experiment Farm was made in Bulletin 241 and the second in Bulletin 272. This farm was authorized at the November election, in 1911, and was selected the following spring. The soil of this farm is upland clay, lying nearly level, and urgently in need of drainage. This work was begun as soon as possible after possession of the farm was obtained, and has been continued until the larger part of the tillable portion is well drained. An experiment has been started in the use of fertilizers and manure in a rotation of corn, soybeans, wheat and clover, the plan of which is given in Table XXXIV, and the results for 1914 in Tables XXXV, XXXVI and XXXVII.

TABLE XXXIV: Plan of fertilizing in corn-soybeans-wheat-clover rotation, Hamilton County Experiment Farm.

Plot No.	Treatment	Pounds per acre on: Corn	Soybeans	Wheat	Plot No.
1	No treatment	...	...	...	1
2	Acid phosphate	200	100	200	2
3	Acid phosphate Muriate potash	200 50	100 20	200 20	3
4	No treatment	...	...	...	4
5	Acid phosphate Muriate potash Nitrate soda	200 50 50	100 20 30	200 20 80	5
6	Yard manure, untreated	5 tons	...	5 tons	6
7	No treatment	.....	...	.....	7
8	Shed manure, untreated	5 tons	...	5 tons	8
9	Shed manure, phosphated	5 tons	...	5 tons	9
10	No treatment	.....	...	.....	10
11	Shed manure, phosphated Ground limestone	5 tons 2 tons	... ...	5 tons	11
12	Shed manure, phosphated Ground limestone Acid phosphate Muriate potash Nitrate soda	5 tons 2 tons	... ...	... ... 200 50 50	12
13	No treatment	.....	...	...	13

Note: The fertilizers, including the nitrate of soda, to be applied just before planting the crop. The manure to be plowed under for corn, but applied as a top dressing for wheat. The "phosphated" manure to be treated with 40 pounds of acid phosphate per ton of manure, the phosphate to be mixed with the manure before spreading.

TABLE XXXV: Fertilizers and manure on CORN at the Hamilton County Experiment Farm, 1914. Rotation I—Corn-soybeans-wheat-clover.

Plot No.	Treatment	1914				2-year average				Plot No.
		Yield per acre		Increase or decrease (—) per acre		Yield per acre		Increase or decrease (—) per acre		
		Grain Bus.	Stover Lbs.	Grain Bus.	Stover Lbs.	Grain Bus.	Stover Lbs.	Grain Bus.	Stover Lbs.	
1	None	37.36	3,185	.....	.....	41.89	3,517	.....	.....	1
2	Acid phosphate, 200 lbs	49.36	2,445	8.52	—730	49.39	3 617	5.76	113	2
3	Acid phosphate, 200 lbs.; muriate potash, 50 lbs	62.57	2,720	18.26	—445	58.35	3,165	12.98	—326	3
4	None	47.79	3,155	.....	.....	47.11	3,477	.....	.....	4
5	Acid phosphate, 200 lbs.; muriate potash, 50 lbs.; nitrate soda, 50 lbs	54.07	3,215	6.47	213	52.32	3,287	5.37	—35	5
6	Yard manure, untreated, 5 tons	48.36	3,415	.96	567	47.18	3,522	.41	355	6
7	None	47.21	2,695	.....	.....	46.60	3,012	.....	.....	7
8	Shed manure, untreated, 5 tons	64.43	3,290	12.53	757	54.93	3,480	7.03	592	8
9	Shed manure, phosphated, 5 tons	59.21	3,355	2.61	983	54.25	3,127	5.04	363	9
10	None	61.29	2,210	.....	.....	50.50	2,640	.....	.....	10
11	Shed manure, phosphated, 5 tons.; ground limestone, 2 tons	51.64	3,685	—4.36	1,472	48.03	3,287	.80	711	11
12	Shed manure, phosphated, 5 tons.; ground limestone, 2 tons	54.29	3,300	3.57	1,083	47.86	3,375	3.88	861	12
13	None	45.43	2,220	.....	.....	40.71	2 450	.....	.....	13
	Average unfertilized yield	47.82	2,693	. ..	.....	45.36	3 019	.....	.....	

TABLE XXXVI: Fertilizers on SOYBEANS at Hamilton County Experiment Farm, 1914. Rotation I—Corn-soybeans-wheat-clover.

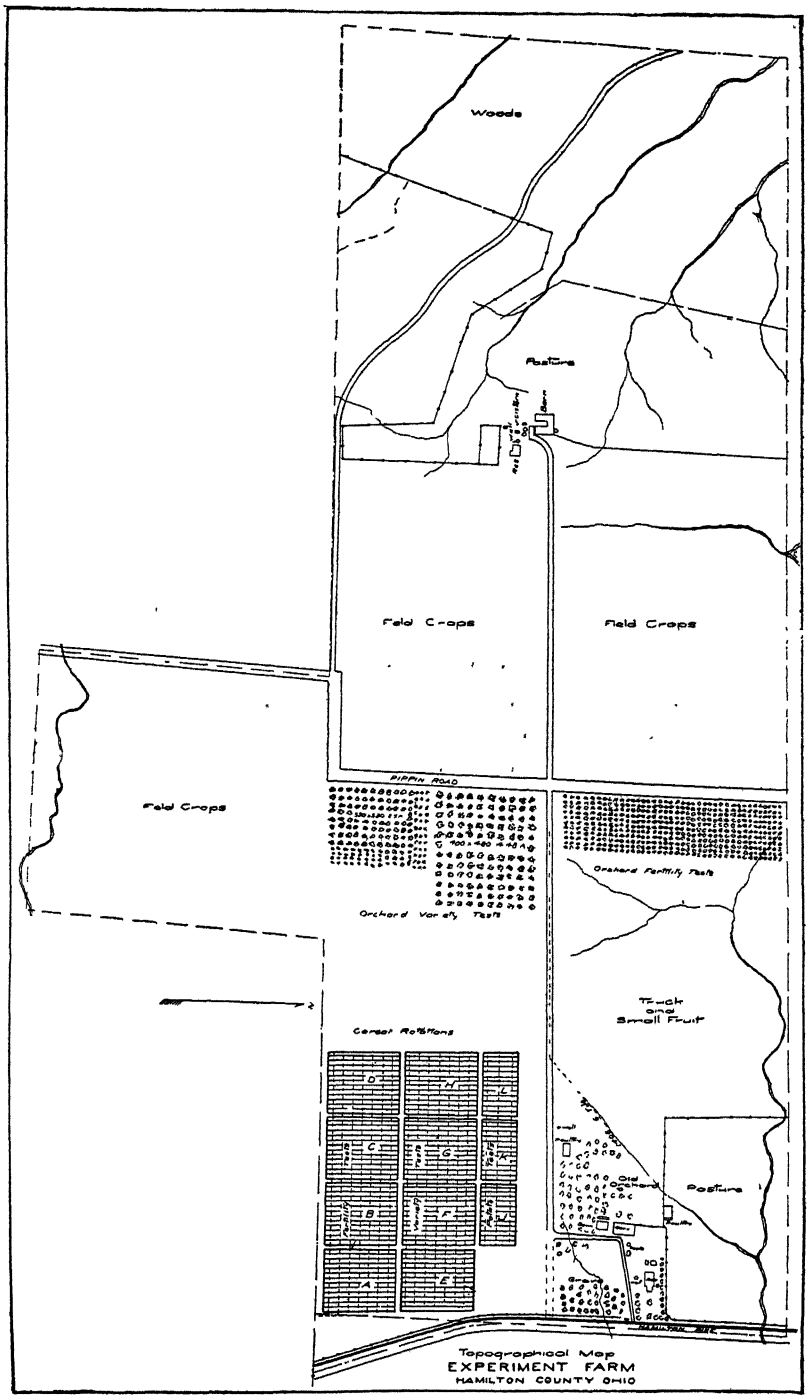
Plot No.	Fertilizers per acre on soybeans	Yield per acre		Increase or decrease(—) per A		Plot No.
		Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.	
1	None	5.75	1 075	.....	....	1
2	Acid phosphate, 100 lbs.	5.17	990	—1.16	40	2
3	Acid phosphate, 100 lbs.; muriate potash, 20 lbs.	5.83	950	—1.09	125	3
4	None	7.50	700	.....	....	4
5	Acid phos., 100 lbs.; mur. potash, 20 lbs.; nit. soda, 30 lbs.	9.08	605	1.27	—60	5
6	*	7.58	545	—.53	—85	6
7	None	8.42	595	.....	....	7
8	*	7.83	630	—.42	8	8
9	*	7.58	495	—.51	—153	9
10	None	7.92	675	.....	....	10
11	*	7.50	550	—.64	—28	11
12	*	7.67	690	—.69	208	12
13	None	8.58	385	.....	....	13
	Average unfertilized yield	7.63	686	.....	....	

*Plots 6, 8, 9, 11 and 12 receive no fertilizer or manure on soybeans; for treatment on corn and wheat see Table XXXIV.

TABLE XXXVII: Fertilizers and manure on WHEAT at Hamilton County Experiment Farm, 1914. Rotation I—Corn-soybeans-wheat-clover.

Plot No.	Fertilizer per acre on wheat	Yield per acre		Increase or decrease(—) per A		Plot No.
		Grain Bus.	Straw Lbs.	Grain Bus.	Straw Lbs.	
1	None	13.25	1,605	....	....	1
2	Acid phosphate, 200 lbs.	21.33	1,820	5.89	80	2
3	Acid phosphate, 200 lbs.; muriate potash, 20 lbs.	25.17	2,265	7.73	390	3
4	None	19.83	2,010	....	....	4
5	Acid phos., 200 lbs.; mur. potash, 20 lbs.; nit. soda, 80 lbs.	24.17	2,525	3.09	323	5
6	Yard manure, untreated, 5 tons	21.17	2,230	—1.16	—163	6
7	None	23.58	2 585	....	....	7
8	Shed manure, untreated, 5 tons	19.08	2,155	—1.70	65	8
9	Shed manure, phosphated, 5 tons	20.83	2,275	2.86	420	9
10	None	15.17	1,490	....	....	10
11	Shed manure, phosphated, 5 tons; ground limestone, 2 tons.	23.17	2,810	8.36	1,332	11
12	Acid phos., 200 lbs.; mur. potash, 50 lbs.; nit. soda, 50 lbs.	23.92	2,465	9.48	998	12
13	None	14.08	1 455	....	....	13
	Average unfertilized yield	17.18	1 829	...	....	

These tables indicate that the fertilizers and manure have produced some increase of crop in corn and wheat but none in soybeans. The results, however, are too irregular to justify any conclusions as to the relative effectiveness of the different treatments. This, however, is not an unusual occurrence in beginning such work on undrained land, especially upon land lying so nearly flat as does that upon which this test is located. The land has been underdrained and has been plowed in narrow lands to provide surface drainage, but it will require several years for these treatments to produce the uniformity of condition essential to successful field experimentation.


Woods
Pasture
Field Crops
Field Crops
Field Crops
PIPPIN ROAD
Orchard Fertility Tests
Orchard Variety Tests
Truck and Small Fruit
Pasture
Topographical Map
EXPERIMENT FARM
HAMILTON COUNTY OHIO

VARIETY COMPARISONS

DEPARTMENT OF AGRONOMY

CORN

Nine varieties of corn were tested in 1914 and the same in 1913. In 1913, Cook's 75 was highest in yield, with Darke County Mammoth, second. In 1914 Leaming-Cuppy was first, Reid, second, and Darke County Mammoth third. Averaging the two seasons' work, Leaming-Cuppy stands first, Cook's 75 (a strain of Reid) second and Darke County Mammoth, third.

TABLE XXXVIII: Variety corn test, Hamilton county.

Variety	Bushels of corn per acre			Lbs. of stover per acre
	1914	1913	2-yr. av.	
Leaming	54.95	48.99	51.97	1,762
Clarage (Local)	57.00	52.23	54.61	2,637
White Cap	43.49	51.42	47.45	1,972
Cook's 75	57.52	57.60	57.56	2,617
Reid (Orcutt)	61.79	52.13	56.96	2,707
Ohio 84	48.03	42.03	45.03	1,557
Clarage (Northern)	53.40	46.60	50.00	1,797
Leaming-Cuppy	67.68	51.84	59.76	2,227
Darke County Mammoth	61.26	53.18	57.22	2,411

SILAGE CROP TESTS

A very satisfactory silage crop test was conducted in 1913, as reported in the table below. The test was repeated in 1914 but the results are unreliable, owing to a very poor stand of plants. Such things happen occasionally in spite of careful work.

The crops tested in 1913 were planted May 20 and harvested on September 17. The yields recorded are the weights of green forage. The yields of the sorghums rank high in weight, but in quality they are not equal to corn. The larger, later varieties of corn like the Eureka do not furnish as much food value per given weight as the earlier sorts. In this test the planting of soybeans with corn reduced the total yield 1.8 tons per acre. In some other similar tests the proportion of beans in the mixture has been too small to affect the quality very much.

TABLE XXXIX: Silage crop tests, Hamilton county.

Variety or mixture	Tons green forage per acre
Blue Ridge	12.43
Connor's Prolific	12.12
Eureka	13.17
Blue Ridge Corn and Soybeans	10.63
Reid	9.02
Boone County White	11.04
Darke County Mammoth	10.68
Early Amber Sorghum	12.33
Early Orange Sorghum	13.18
Millet and Soybeans	5.53

OATS

While the Hamilton county variety corn tests hold up well in yield in comparison with the county experiment farms to the north, the yields of oats are much lower, running less than half the yields of oats in Miami county. The test in 1913 was exceptionally poor. In 1914, two varieties—the Big Four and the Silvermine—yielded over 40 bushels per acre, but such yields are hardly profitable.

Averaging the two seasons' tests the Silvermine stands first and the Big Four, second.

TABLE XL: Variety oats test, Hamilton county.

Variety	Bushels of oats per acre			Lbs. of straw per acre
	1914	1913	2-yr. av.	
Big Four	46.21	17.93	32.07	1695
Silvermine	42.88	21.51	32.19	1855
Swedish Select	27.82	8.02	17.92	1920
Ohio 7009 (Sixty Day)	25.54	16.92	21.23	1750
Ohio 6203 (Siberian)	25.81	11.34	18.57	1407
Ohio 6222 (Improved American)	36.99	11.93	24.46	1655
Wideawake	38.09	16.09	27.09	1719
Oderbrucker barley	14.38	8.96	11.67	810
Emmer	23.44	6.87	15.15	1750

WHEAT

Only one test of varieties of wheat has been concluded in this county. Nine varieties were tested, of which the Ohio 6400, a selection of Poole, has a slight lead, with the Red Wave second and the Nigger third.

TABLE XLI: Variety wheat test, Hamilton county.

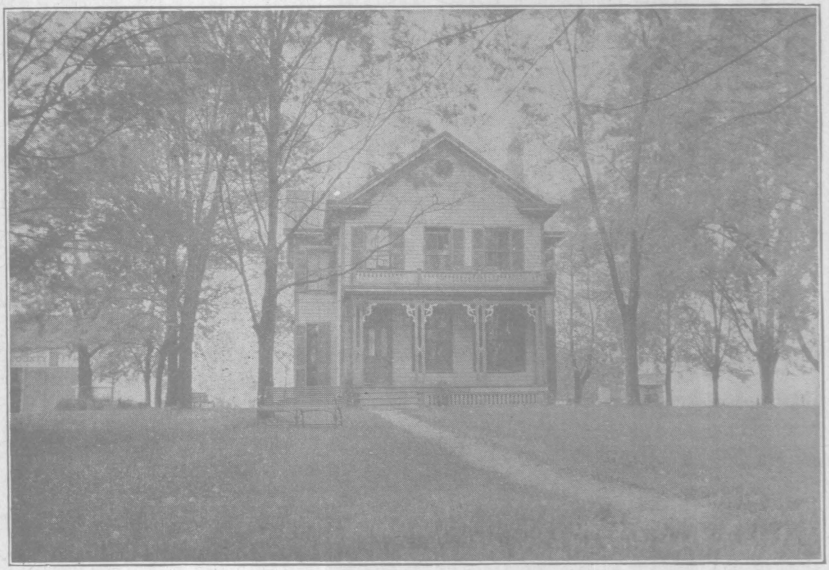
Variety	Yield per acre 1914	
	Bushels	Lbs. straw
Nigger	27.41	3,015
Ohio 6100 (Gypsy)	22.35	2,455
Mediterranean	22.14	2,450
Red Wave	28.47	2,865
Turkey Red	22.35	2,520
Ohio 8106 (Fultz)	26.57	3,060
Ohio 6400 (Poole)	28.85	2,560
Goens	23.57	2,820
Velvet Chaff	22.80	3,050

SOYBEANS

In the soybean test eight varieties have been grown for two years and one variety of cowpeas—the New Era—for comparison. In 1913 the Mongol was first, with Ohio 9035 a close second. In 1914 the Ohio 9035 was first, with the Mongol, second.

TABLE XLII: Variety soybean test, Hamilton county.

Variety	Bushels of beans per acre			Pounds of straw per acre
	1914	1913	2-yr. av.	
Medium Green	7.92	13.90	10.91	1,770
Mongol	12.28	19.46	15.87	2,565
Ebony	12.25	16.51	14.38	2,117
Chestnut	11.61	10.34	10.97	1,665
Ohio 9100	11.34	15.35	13.34	1,815
Ohio 9016	5.51	15.13	10.32	1,167
Ohio 7496	11.56	15.29	13.42	1,937
Ohio 9035	14.17	19.30	16.73	2,432
New Era Cowpeas	7.08	5.33	6.20	1,977



Residence at Hamilton County Experiment Farm.

THE WASHINGTON COUNTY EXPERIMENT FARM

FIRST ANNUAL REPORT

C. E. THORNE

Late in the winter of 1913-14 official notice was received that Washington county had voted in favor of establishing a county experiment farm, and that bonds to the amount of $20,000 had been sold for this purpose. The Agricultural Commission visited the county in March, and after several visits and very careful study of the situation, directed the purchase of two tracts of land, one of 170 acres at Fleming, and one of nearly 10 acres in the Muskingum valley, about 4 miles north of Marietta.

The agricultural conditions in Washington county are materially different from those existing in any other county of the state. The county lies on the Ohio river, in the southeastern quarter of the state, and in topography is very hilly, as are all the counties bordering that river. The Muskingum river, flowing through the county from northwest to southeast, divides it into two nearly equal areas, and the flood plain of this river, as it approaches the Ohio, expands to a width of one to two miles, much of which is ordinarily above overflow.

In the early history of the county orcharding and sheep husbandry became prominent features of its agriculture; but with the increase of insect and fungous pests in the orchards they became less productive and fell into decay, while the sheep flocks, which had been bred and maintained almost solely for their wool, went into decline when the artificial stimulus to wool production given by the tariff was withdrawn.

Meanwhile a large trucking industry had grown up in the Muskingum valley, the land there being naturally drained by underlying gravel, and sheltered from cold winds by the high hills surrounding it on all sides except the south, while the soil had become very fertile from the washings from those hills and the deposits from the occasional floods, usually coming as back water from the Ohio. Some idea of the importance to which trucking has attained in this region may be given by the statement that at the height of the season the past summer the daily shipments from it of tomatoes and other truck crops amounted to more than 30 carloads.

But the truck growers are not without their troubles. Blight and insect pests have sometimes caused serious losses, and evidence is increasing that some other means must be found for maintaining the fertility of the soil than natural agencies. For these reasons the truck growers had taken a very active interest in the establishment of the county experiment farm, and the Agricultural Commission felt that a recognition of the trucking industry was due, not only because of the local interest, but because of the fact that this industry is developing in many other sections of the state, due to the rapid increase in urban population, and that no adequate opportunity for the study of trucking problems has as yet been offered in the state.

But trucking, large as this industry has become in this county, constitutes after all but a small part of the total agricultural activities of the county. The Experiment Station has already demonstrated the possibility of reviving the orchards of the county, while the clothing of the more rugged portions with pasture grasses and useful forest growth are problems of vast importance. For these reasons the Agricultural Commission felt that the experiment farm for this county must be so located as to be able to take up some of the questions concerning the hill-land farmer, as well as the trucker.

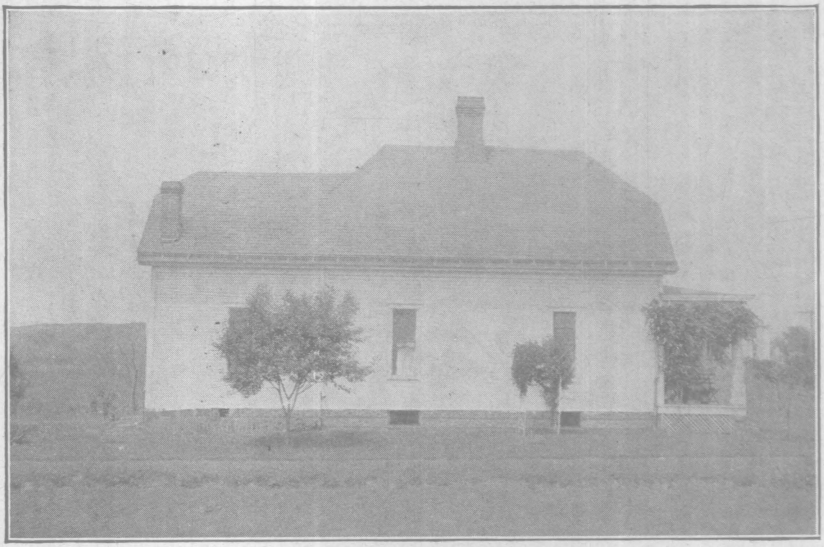
Farm residence on Washington County Experiment Farm.

It would have been very desirable to secure in one farm the necessary conditions for the study of all the varied agricultural activities of the county, but this was found to be impracticable, because the hills immediately bordering the valleys are so abrupt that no land could be found on these hills suitable for the plot studies which are an indispensable feature of the work of an experiment farm, and hence the selection of the two tracts, the one for trucking, the other for the study of general farming.

Possession was obtained of the stock farm at Fleming in the spring of 1914, Mr. C. B. Harvey was employed as foreman and the summer was spent in the rearrangment of fences and buildings and the beginning of a system of drainage. A comparative test of varieties of corn was made and fertility studies were begun in the wheat crop, sown in the fall.

Possession of the truck farm was not obtained until fall, so that no experimental work was undertaken. Mr. O. N. Riley was employed as foreman, and began preparing the land for its purpose.

Mr. E. J. Riggs was appointed County Agricultural Agent and superintendent of the county experiment farms and the following proposed plan of management was submitted by him to the Washington County Agricultural and Mechanical Association and approved by them on August 27.



Residence on Washington County Experiment Truck Farm.

PROPOSED PLAN OF MANAGEMENT

TRUCK GARDENING

As truck gardening has attained larger proportions in Washington county than any other part of the state, having become one of the most important agricultural industries of the county, the county experiment farm has been selected with special reference to this industry, and experiments with truck crops will be undertaken in the comparison of varieties, in the use of fertilizers, and in methods for the control of injurious insects and plant diseases. These experiments will be conducted chiefly on the 10-acre, valley truck farm near Marietta, but it is proposed to undertake some lines of truck growing on the upland farm at Fleming.

ORCHARDING

Washington county contains more acres of apple orchards than any other county of Ohio, and in the early history of the state these orchards were a very considerable source of income. The work that has been done by the Experiment Station in the orchards of Washington county during recent years has demonstrated the possibility of reviving the orchard industry of this county and placing it on a permanent basis, and it is proposed to make a careful study of such orchard problems as the comparison of varieties, the control of orchard insects and diseases, and the use of fertilizers, cover crops and mulch.

ANIMAL HUSBANDRY

The statistics of crop production in Washington county indicate that not more than one-fourth of the total area of the county is under cultivation, the remainder being pasture, woodland and waste, and it is probable that the areas devoted to pasture and woodland should be increased rather than diminished.

Wool-growing has been a prominent industry in Washington county since its occupation by the white man, and most of its farmers are accustomed to the handling of sheep. Under present conditions the keeping of sheep for the wool alone has ceased to be profitable in Ohio, but there is good reason to believe that sheep may be grown primarily for meat, the wool being an incidental product, with a reasonable expectation of greater profit than has ever been realized under the former methods of sheep husbandry. We believe, therefore, that this should be made one of the leading features of the work of the Washington county experiment farm.

No other kind of livestock is so well suited to the orchard as poultry. They can have the run of the orchard without the slightest danger of injury to the trees, but on the contrary with assurance that they will be of material assistance in holding insect pests in check, while the range and exercise will be an important factor in maintaining the health of the flock. Moreover, the forest growth, which should always cover the steep hillsides of Washington county, also affords an ideal range for poultry. For these reasons this industry should be given a very prominent place in any plan for the improvement of the agricultural conditions of this county.

Dairying can be practiced most successfully in regions convenient to transportation and having a considerable proportion of land suitable for cultivation, on which to grow the grains required to make the most effective milk producing ration. These conditions may be found over much of the western half of Washington county; but over the eastern half the lack of railroad transportation and the ruggedness of the country would point to sheep and poultry husbandry as the more logical lines of livestock development.

THE MAINTENANCE OF SOIL FERTILITY

No other problem is of so great importance in agriculture as that of the economical maintenance of the fertility of the soil. For this reason experiments with fertilizers and manures on crops grown in systematic rotation are being made one of the leading features of work on all the county experiment farms in Ohio, these experiments being so planned as to articulate with those in progress at the State Experiment Station and also to include crops or problems of local interest. In Washington county special attention should be given to the fertilizing of truck crops, orchards and pastures.

Following is a detailed plan of the work in sheep husbandry proposed for the Washington county experiment farm:

WORK IN SHEEP HUSBANDRY RECOMMENDED FOR THE WASHINGTON COUNTY EXPERIMENT FARM

DEPARTMENT OF ANIMAL HUSBANDRY

During the last few years the sheep have been rapidly disappearing from many of the farms of Washington county as well as of most other parts of southeastern Ohio. The sheep industry of this section of the state has long been purely a wool growing proposition, to the almost total neglect of the possibilities of mutton production, and one of the most important contributing causes of the passing of the sheep from this section has been the lack of faith in

wool prices in the face of the inevitable removal of the duty on wool. With the object in mind of preserving this important industry of the state, it is proposed to demonstrate on the Washington county experiment farm a rational system of sheep farming for this and surrounding counties, which shall be independent of tariff or other legislation and which it is hoped will be more profitable than the system now commonly followed in that locality. In such a system the production of mutton will be the chief consideration, although the production of a good grade of wool is not to be lost sight of. The purpose of this demonstration is neither to introduce a new system of flock husbandry nor radically to revolutionize prevailing practices, but to endeavor to show that a waning industry may be converted into one that is profitable.

It is proposed to purchase a foundation flock of about 50 ewes, which may be added to if it is found desirable to do so. The sheep kept in Washington county are practically all of Merino origin, and since these sheep are well adapted to the environment, and since it is desirable to stay as close as is practicable to prevailing practices, it is proposed that this foundation flock be of large, smooth bodied, Delaine Merino ewes. In order to have some young ewes of the desired type coming on to maintain the flock, these ewes are to be bred this fall (1914) to a smooth bodied Delaine Merino ram, showing a good mutton form. That the flock may be self sustaining, the ewes, or as many as may seem desirable, are to be bred to a Delaine ram of the type already described, as often as it may be necessary, which may be every other year or possibly two out of every five years. All desirable ewe lambs from such matings are to be kept to maintain the breeding flock, and all males sold as lambs. When not necessary to obtain ewe lambs to keep up the flock, the ewes are to be bred to a ram of one of the English Down breeds, probably a Southdown, and all the offspring of such crosses sold as lambs. An experiment is now in progress at the Southeastern Test Farm at Carpenter to compare Delaine with cross bred Southdown Delaine lambs with respect to rate and economy of gains and value of carcass, and if the results secured from this experiment or other information should warrant such a change, the use of rams of the Down or strictly mutton breeds will be abandoned and only mutton type Delaine rams used, thus greatly simplifying the breeding operations and the handling of the flock.

The number of ewes kept will be such as may be maintained and their lambs made ready for market on the roughage raised on the farm. Since Washington county is a grazing rather than a

grain growing county and should produce more live stock than can be fattened on the amount of grain raised, the practice of purchasing grain from the grain growing sections of the state, whenever needed, seems thoroughly justified. It is planned to compare the efficiency of different winter rations for breeding ewes. Permanent pastures are to be relied upon mainly for summer feed, but these are to be supplemented quite extensively with the forage crops, for the double purpose of improving the pastures and helping to avoid parasitic infestation of the sheep. Since over-stocking and other abuses of pastures are evident in Washington county, it is hoped to demonstrate methods of pasture improvement both by fertilization and by so supplementing them with other pasture crops as to give them an opportunity to yield maximum returns.

The majority of the sheep sold in Southeastern Ohio are either wornout breeding ewes or mature wethers, which are not greatly in demand in the market and do not command the highest prices. The reason for this practice seems to be that the farmers fail to realize this difference in price between lambs and wethers, because they do not know the market requirements for lambs, and because they do not have the feeds or do not know how properly to fit lambs for market. Therefore, it is proposed in the work at the Washington county farm to sell lambs and endeavor to educate the flock owner along the lines mentioned.

The market for the lambs will have to be determined later. The city of Marietta or butchers in that city supplying the steamboat trade on the Ohio river should furnish a good outlet, and the Pittsburg market is also easy of access. The time when the lambs are sold will have to be determined somewhat by circumstances. The production of lambs in the early spring or during midsummer is one of the most promising possibilities.

VARIETY COMPARISON OF CORN

DEPARTMENT OF AGRONOMY

Possession of the Washington county farm was secured so late in the spring that it was impossible to start much work along field crop lines. A test of 10 varieties of corn was conducted on the Fleming farm. Of the varieties under uniform treatment a local variety secured from Mr. Fleming gave the highest yield, with Reid (Orcutt's) second, and Leaming (Frost's), third. In many tests conducted by the Station the well acclimated local varieties have outyielded those brought in from a distance.

On two plots of this test 50 lbs. of 16% acid phosphate per acre were used in the row. Under the conditions obtaining last season subtantial increases in yield were secured.

TABLE XLIII: **Variety corn test, Washington county.**

Variety	Yield per acre, 1914	
	Bushels	Lbs. of stover
Leaming (Peter D)	30.42	1,724
Leaming (Frost's)	39.45	1,390
Reid (Orcutt's)	39.98	2,584
White Cap	33.82	1,688
Strain 84	27.91	1,687
Strain 74	34.36	2,231
O. P. B. A. 213	33.15	1,361
Darke County Mammoth	38.54	1,537
Fleming	41.44	1,954
Clarage	33.35	1,776
Fleming, with 50 lbs. A. P	50.23	2,700
Clarage, with 50 lbs. A. P	36.11	2,094

SUMMARY OF EXPERIMENTS WITH FERTILIZERS AND VARIETIES

In Table XLIV the principal results of the experiments with fertilizers on all the farms are arranged in such manner as to show the comparative effect of phosphorus used alone, or with potassium, or with both potassium and nitrogen.

The table shows that in every case, excepting at Paulding, the acid phosphate has produced a marked increase of crop. The table does not indicate that the larger quantity used at the county experiment farms is producing a larger increase than the smaller quantity used at Wooster and Strongsville; but in fact, the increase in these two tests was very much smaller in the beginning of the experiment

TABLE XLIV: Summary of experiments with fertilizers on corn and wheat. Average annual increase in bushels per acre.

Station	Yr.	Corn				Wheat			
		Phosphorus[1]	Phosphorus and potassium[2]	Phosphorus, potassium and nitrogen[3]	Manure (per ton)	Phosphorus[1]	Phosphorus and potassium[2]	Phosphorus, potassium and nitrogen	Manure (per ton)
Wooster: 5-year rotation	21	7.74	14.94	19.20	3.25	7.95	9.03	15.93	1.67
Manure test	18	....	.....	11.44	2.74	....	....	4.79	1.36
Strongsville: 5-year rotation	20	8.05	9.93	11.64	1.85	6.58	7.47	9.25	1.09
Germantown: 3-year rotation	11	7.23	12.14	13.65	2.71	4.89	5.74	8.85	1.16
Carpenter: 3-year rotation	11	7.29	8.64	12.18	2.10	4.81	6.55	9.47	1.25
Findlay: 4-year rotation	6	3.75	8.15	6.37	2.24	5.55	6.73	3.75	1.77
Miami Co.: 4-year rotation I	4	8.43	10.41	9.71	1.23	6.29	7.75	4.16	....
" " " " II	4	7.40	10.42	4.13	....	6.04	8.92	12.97	....
" " " " III	4	8.87	12.22	10.62	1.98	....	....	....	....
Paulding Co.: 4-year rotation I	2	—5.99	—8.29	—0.50	....	—4.99	—2.73	5.15	....
" " " " II	2	—5.21	—5.57	3.72	....	2.58	2.50	5.86	....
Clermont Co.: 4-year rotation	2	6.48	8.67	9.76	2.00	4.00	4.50	7.83	....
Hamilton Co.: 4-year rotation	2	5.76	12.98	5.37	1.20	5.89	7.53	3.09	....

[1]Carried in 14 percent acid phosphate, used at the rate of 80 pounds per acre on corn and 160 pounds on wheat at Wooster and Strongsville, 120 pounds on each crop at Germantown, Carpenter and Findlay, and 200 pounds on each crop at the county experiment farms.

[2]Carried in muriate of potash, used at the rate of 80 pounds per acre on corn and 100 pounds on wheat at Wooster and Strongsville, 20 pounds on each crop at Germantown, Carpenter and Findlay, and 50 pounds at the county experiment farms.

[2]Carried in muriate of potash, used at the rate of 80 pounds per acre on and in the equivalent of that quantity on wheat at Wooster and Strongsville (50 pounds dried blood in the fall and 120 pounds nitrate of soda in the spring) 80 pounds on corn and the equivalent of that quantity on wheat at Germantown, Carpenter and Findlay (20 pounds dried blood in the fall and 60 pounds nitrate of soda in the spring) and 50 pounds on each crop, all applied in the fall, at the county experiment farms.

than since, the average increase from acid phosphate alone having been 4 bushels of corn and less than two bushels of wheat at Wooster and 4 bushels of corn and 5½ bushels of wheat at Strongsville for the first 5 years of the test.

At $14.00 per ton at the warehouse and allowing $2.00 per ton for cost of application, the dressing of 120 pounds of acid phosphate used at Findlay would cost 96 cents. Computing corn at half a dollar per bushel and allowing 10 cents per bushel for harvesting the increase produced by the fertilizers, the net value of this increase, over all cost of treatment, would be 54 cents, or more than 50 percent on the investment in fertilizer. This is the lowest net increase produced in any one of the tests from acid phosphate used alone, excepting that on the comparatively new black land at Paulding.

The smallest increase in wheat produced in any of these tests by acid phosphate used alone has been that at the Clermont county farm, where, as a 2-year average, 150 pounds of acid phosphate has apparently increased the crop by 4 bushels per acre. Computing acid phosphate as before, the cost of application would be $1.20, and if we value wheat at 90 cents per bushel and deduct 10 cents for harvesting the extra crop, the net value of the increase would be $2.00, or 166 percent on the investment.

In these calculations no allowance is made for the increased value of the straw and stover due to the fertilizer, nor for its residual effect upon the succeeding crops of the rotation. As a matter of fact, the total net value of the increase due to the application of 320 pounds of acid phosphate in a 5-year rotation of corn, oats, wheat, clover and timothy, the fertilizer being used at the rate of 80 pounds each on corn and oats and 160 pounds on wheat, has amounted to a 20-year average of $13.92 at Wooster and to a 19-year average of $14.88 at Strongsville, or about 500 percent on the investment.*

When the acid phosphate has been reenforced with muriate of potash there has been a further increase of crop in all the tests, excepting again that at Paulding, but the additional increase has not always been sufficient to cover the added cost of the fertilizer.

At Wooster the increase in corn has abundantly justified the use of the potassium, while that of wheat has not. The residual increase in the clover and timothy, however, has been sufficient to justify the adding of the potassium salt, with a margin to spare, even when the cost of the potassium has been more than twice as great as that of the phosphorus. At Strongsville the increase due

*See Circular 144, pp 79 and 97

to the potassium salt has not in any case been sufficient to cover the additional cost of the fertilizer, the average total gain for the addition of 260 pounds of muriate of potash in each rotation being but $1.39 over that produced by acid phosphate alone.

Where the potassium salt has been added in the smaller quantities used in the other tests, the cost being 50 cents per acre for each crop at Germantown, Carpenter and Findlay, and $1.25 per acre for each crop at the county experiment farms, this additional cost has been returned in the increase with a liberal margin in every corn crop, but the wheat crops have not always been sufficiently increased to pay for the potassium without the help of the residual effect on the clover following the wheat. Taking the entire rotation, however, the present indications are that on all these county experiment farms the use of such a combination of phosphorus and potassium as has been employed in these tests will produce a greater net gain per acre than will the phosphorus alone.

The addition of nitrogen in nitrate of soda has been justified at Wooster in the total results of the rotation, although the increase of corn has not recovered the additional cost of the fertilizer. The smaller quantity of the nitrate used at the district and county experiment farms has been paid for in the increase at Carpenter only, the apparent increase of wheat in Rotation II at the Miami county farm being offset by the low yield of corn, indicating that soil variation has as yet had more to do with the effect than nitrogen in the fertilizer. The average results of the two years' work on the Clermont county farm justify the addition of nitrogen to the fertilizer, and it is highly probable that these results will be confirmed by longer tests, as the soil of that farm had been depleted by a still longer period of exhaustive husbandry than that which has brought the Wooster farm to its present condition.

While it is too soon to attempt to draw any but the most general conclusions from the work on these county experiment farms, it is evidently safe to say that on all the land in their vicinity which has been in cultivation for a quarter century or more it will pay to use fertilizers carrying available phosphorus, such as acid phosphate or steamed bonemeal, and that on much of the land, especially that which has been longest under cultivation, it will pay to add potassium to the fertilizer if it can be procured at cost not exceeding that of muriate of potash before the European war cut off the supply.

Nitrate of soda is both the cheapest and the most effective carrier of fertilizer nitrogen, and until the addition of nitrate of soda to the fertilizer produces a more decided increase of crop than

has yet been shown in most of these tests the farmer will do wisely to look to the stable and to the clover field for his supply of nitrogen.

But manure is rich in potassium as well as nitrogen, and by careful attention to the production, saving and economical use of manure, the farmers of Ohio may be independent of the potash mines of Germany.

In computing the effect of manure in Table LXIV the increase has been given "per ton of manure" in order to compare the various rates of application; but the increase as shown in the table is in every case but a part of the total effect of the manure, as instead of applying it to every crop of the rotation it has been used on but two crops in the 5-year rotations at Wooster and Strongsville and on but one in the manure test at Wooster, and in the 3-year and 4-year rotations of the remaining tests, so that the increase which is shown from manure in these tests is a residual increase, and is a part only of that, the remaining crops of the rotation always showing the effect of the manure.

Moreover, manure is not a well balanced fertilizer for soils which have become so depleted of phosphorus as have the older lands of Ohio, as is shown by the long continued test at Wooster, in which the addition of acid phosphate to the manure has produced the effect shown below, the manure being applied to corn in a 3-year rotation of corn, wheat and clover:

Manure and treatment	Net value of increase per ton of manure 16-year average
Yard manure, untreated	$2.60
Stall manure, untreated	3.31
Yard manure and acid phosphate	4.22
Stall manure and acid phosphate	4.89

The yard manure is taken from the open yard, where it has been exposed to the weather for three or four months during the winter. The stall manure is taken directly from the stable to the field and spread at once in the early part of the winter. The acid phosphate is dusted over the manure at the rate of 40 pounds per ton of manure. The cost of the treatment is deducted before computing the value of the increase.

The manure that is washed from Ohio's barnyards every year probably contains two or three times as much potassium as that carried in the fertilizers sold in the state, together with nitrogen and potassium enough to much more than pay the annual fertilizer bill of the state of about three million dollars.

SUMMARY OF VARIETY COMPARISONS

CORN

In Table XLV are recorded the yields of such varieties as have been tested at the several experiment farms of the state. Of the 8 varieties reported, 5 have stood first on at least one farm. Four of the 5 have only one farm to their credit, while one variety—the Darke County Mammoth—was first on 5 farms.

OATS

Table XLVI gives the yields of oats at the different farms. Silvermine was first on 2 farms, second on 2. Big Four was first on 2 farms, second on one and third on 2. Ohio Selection 6203 was first on one and second on two farms. Sixty Day and Little White were each first on one farm.

WHEAT

In Table XLVII are recorded the yields of 17 varieties of wheat as tested at 8 different station farms. Only 4 of these varieties have been tested at every farm. The Ohio 6400, a pure line selection of Poole wheat, was first at every farm except one, and on this farm (Hancock) it was not tested. The Mediterranean was first at Hancock county farm and second on one. Other varieties which won second position are: Ohio 6414 (a selection of Early Ripe), Ohio 6100 (a selection of Gypsy), Ohio 5309 (a selection of Fultz), Gypsy, Valley and Nigger.

SOYBEANS

Table XLVIII gives the comparative results with soybeans at four farms. While a different variety won first at each farm, Ohio 9035, a medium to late brown selection, was first on one farm, second on two and third on one. Ohio 7496, a medium yellow selection, was first on one, second on another and third on one. Chestnut, an early yellow variety, was first on one and third on another farm.

The necessity for the further testing of varieties of farm crops on the above county farms, and the desirability of working out these, and similar problems in many more counties of the state would seem to be apparent.

TABLE XLV: Leading varieties of corn at the various experiment farms of the state.

Variety	Wooster 10 yrs. Bus. per acre	German-town 5-yrs. Bus. per acre	Carpenter 5 yrs. Bus. per acre	Hancock 3-yrs. Bus. per acre	Paulding 3 yrs. Bus. per acre	Miami 4 years Bus. per acre	Hamilton 2 yrs. Bus. per acre	Clermont 2 yrs. Bus. per acre	Washington 1 yr. Bus. per acre
Darke Co. Mammoth	69.76	67.93	60.47	59.16	47.58	57.91	57.22	32.79	38.54
Leaming	71.91	60.73	54.64	62.11	46.08	50.31	51.97	32.22	30.42
Strain 84 (Early-Reid)	72.14	56.60	49.09	58.78	48.38	46.46	45.03	.....	27.91
White Cap	64.76	.....	.....	.. ..	... .	.....	47.45	27.96	33.82
Medina Pride	70.83	.....	.....	.....	.....	.....	.....	.....	.....
Clarage	65.89	56.35	48.60	54.61	53.83[1]	52.84	54.61	32.30	32.35
Boone Co. White	.....	63.51	50.53	59.67	.....	.....	.....	.....	.....
Cook's 75 (Reid)	.....	62.40	51.31	56.34	51.72	56.19	57.56	32.74	.....

[1]Wheeler's Clarage.

TABLE XLVI: Leading varieties of oats at the various experiment farms of the state.

	Wooster 6 yrs. Bus. per acre	Carpenter 4 yrs. Bus. per acre	Hancock 4 yrs. Bus. per acre	Paulding 3 yrs. Bus. per acre	Miami 3 yrs. Bus. per acre	Hamilton 2 yrs. Bus. per acre	Clermont 2 yrs. Bus. per acre
Big Four	66.93	....	44.61	54.12	63.25	32.07	16.67
Improved American	66.39	....	36.99[3]	....	....	....	....
Ohio 6222 (Imp. Am.)	67.36	....	45.17[3]	55.93	53.11[3]	24.46	8.91
Lincoln	66.20	....	.....	.....	.....	.....	.....
Long's White Tartar	64.13	.....	.....	.....	.....	.....	.....
Siberian	65.87	.....	.....	.....	.....	.....	.....
Ohio 6203 (Siberian)	70.29	29.25	45.35	48.62	60.51	18.57	10.79
Silvermine	66.49	.....	46.32	48.89	61.07	32.19	16.05
Sixty Day	62.79	34.45	....	....	....	....	....
Ohio 7009 (Sixty Day)	64.95	.....	37.12	47.68	55.70	21.23	23.43[4]
Sweedish Select	55.91	....	40.95	46.27	60.67	17.92	7.72
Wideawake	57.36	28.24	39.47	48.52	58.57	27.09	14.18
Little White	....	....	....	56.76	.....	.....	.....
Emmer[1]	36.33	19.06	22.81	....	44.43	15.15	.....
Oderbrucker Barley[2]	36.17	10.74	9.52	....	30.28	11.67	.....

Figured at: [1]32 lbs. per bu. [2]46 lbs. per bu. [3]2 year average. [4]1 year.

TABLE XLVII: Leading varieties of wheat at the various experiment farms of the state.

Variety	Wooster 6 yrs. Bus. per acre	Germantown 5 yrs. Bus. per acre	Carpenter 5 yrs. Bus. per acre	Hancock 4 yrs. Bus. per acre	Paulding 2 yrs. Bus. per acre	Miami 2 yrs. Bus. per acre	Hamilton 1 yr. Bus. per acre	Clermont 1 yr. Bus. per acre
Fultz	32.19	24.37	25.79	16.40	.....	33.41	.....	.....
Ohio 5309 (Fultz)	34.01	27.56	27.39	.....	43.20	39.38	.....	.....
Feltzo-Mediterranean	31.95	19.79	22.11	.....	.....	.....	.....	.....
Gypsy	32.30	29.30	25.04	19.12	....	37.34	....	....
Ohio 6100 (Gypsy)	35.21	30.45	27.34	.....	43.08	39.63	22.35	13.57
Mediterranean	32.18	21.58	25.16	19.62	34.96	35.69	22.14	14.92
Nigger	34.13	24.06	26.20	16.23	42.57	39.74	27.41	13.74
Poole	34.48	27.89	25.18	17.76	....	36.74	....	....
Ohio 6400 (Poole)	37.69	31.04	29.27	.....	46.64	42.27	28.85	19.53
Ohio 6414 (Early Ripe)	36.54	.....	.....	.....	.....	.....	.....	.....
Red Wonder	32.00	....	22.81	.....	.....	.....	.....	....
Rudy	33.42	22.58	23.87	....	38.22	38.49	.....	14.42
Turkey Red	27.59	20.31	22.69	15.24	40.41	38.03	22.35	8.47
Valley	33.56	21.00	25.33	....	....	41.69	....	....
Velvet Chaff	29.07	23.70	24.08	15.86	37.64	37.24	22.80	13.58
Goens	.....	.....	.....	.....	36 31	40.35	23.57	.....
Ohio 8106 (Fultz)	.....	....	.....	.....	.....	35.49	26.57	.....

[1]4-year average.

TABLE XLVIII: Leading varieties of soybeans at the various experiment farms of the state.

	Wooster 4 yrs. Bus. per acre	Hancock 2 yrs. Bus. per acre	Paulding 2 yrs. Bus. per acre	Miami 2 yrs. Bus. per acre	Hamilton 2 yrs. Bus. per acre
Medium Green	21.90	15.11	14.38	19.40	10.91
Ohio 9100	19.17	.....	18.78	17.40	13.34
Ohio 9016	27.65	.....	17.50	20.36	10.32
Ohio 7496	25.60	.....	19.95	23.41	13.42
Ohio 9035	24.97	.....	22.42	22.15	16.73
Mongol	23.78	.....	17.37	21.57	15.87
Chestnut	24.33	.....	25.00	21.59	10.97
Ebony	20.98	.....	18.14	17.64	14.38
New Era Cowpeas	6.67	.....	.....	9.02	6.20